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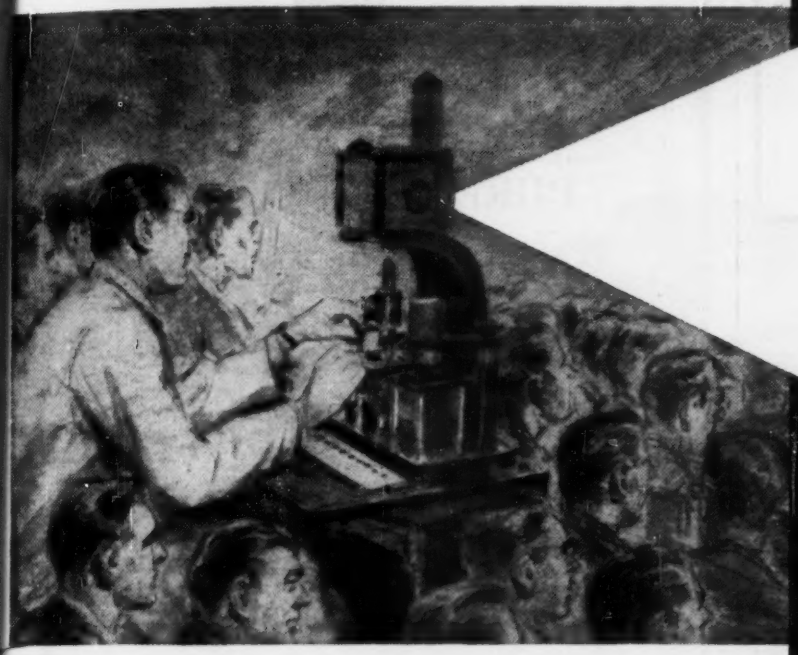

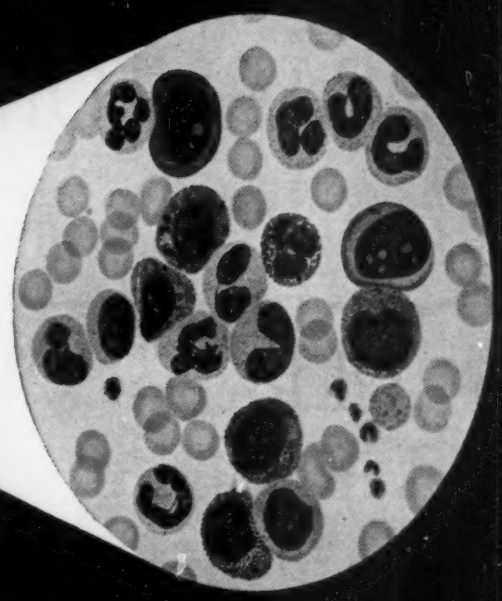

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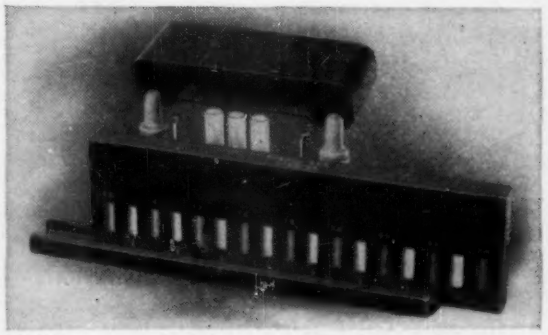

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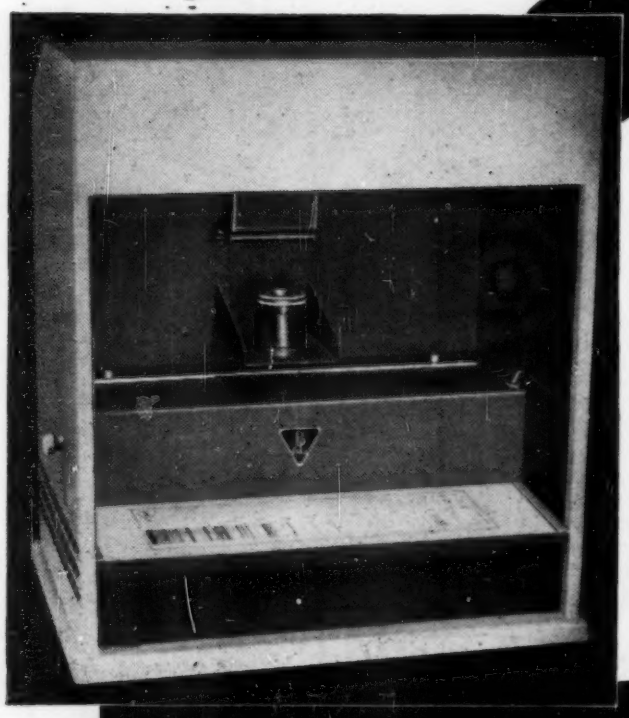

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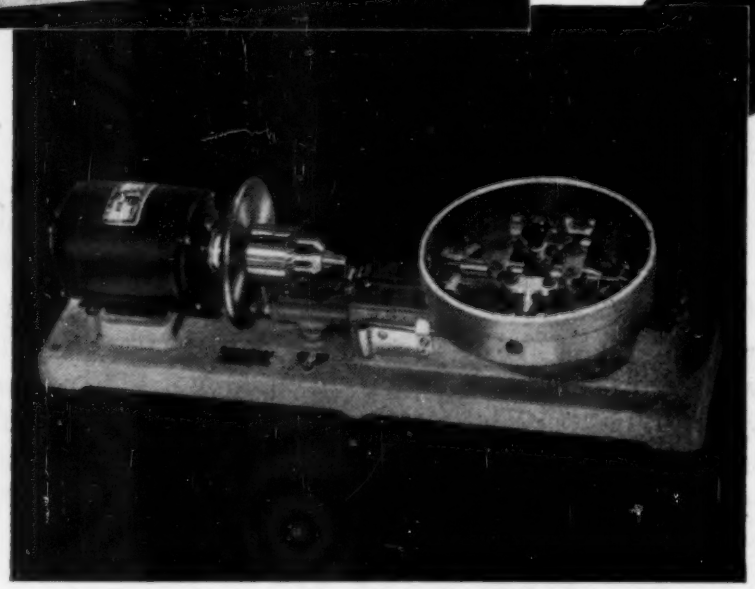

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Social Responsibility

George Brock Chisholm,
Director-General, World Health Organization

IF KURT LEWIN HAD DONE NOTHING ELSE during his too short lifetime but provide the amount of inspiration he did for the psychological study of social issues, his should be judged a highly successful life. Add to that all his influence toward sanity, and the infectiousness of his maturity, understanding, and generous tolerance of human frailties, and we clearly draw the picture of a man, truly a leader in terms appropriate to his time. Kurt Lewin was an explorer and pioneer in fields as beset with pitfalls for the unwary or ill equipped as ever were polar seas or tropical jungles. The reluctance of all of us human beings to know ourselves, the aggressions released by any attempt to help us to know ourselves truly, the antagonisms with which we defend our imbedded original premises, no matter how demonstrably fallacious they may be, are well known to all of us who have learned the lessons of the last half-century of pioneering work in these areas. Still, however, and probably for a long time to come, these human reactions are the great barriers to human progress in those very directions which are of the greatest importance to the whole race. In this area of human evolution there is still great need for unselfish devotion, for dedication to high principles, and even sometimes for a degree of martyrdom.

Kurt Lewin and his co-workers in the United States and in England have begun a process which should eventually contribute greatly to bringing the light of objectivity into the whole field of human relations.

Up until recently, through many generations of development, scientific progress has been almost entirely confined to those fields which would contribute directly to commercial or military advantage in a world functioning on the principle of competitive survival. Only in the last few years has it become clear to the people in all countries who are capable of thinking independently of the hysteria of the media of mass communication that this old method of competitive survival has become synonymous with racial suicide. Under the pressure of the anxiety engendered by this awareness the physical scientists have begun to show signs of developing some social responsibility, and the human scientists, some evidences of concern about the immediacy and importance of world problems of human relations and interhuman communication. The recent International Congress on Mental Health with its main theme of study, "Mental Health and World Citizenship," has been a most encouraging sign of this awakening concern. More than 5,000 people—psychologists, psychiatrists, social anthropologists, sociologists, educators, and others—participated actively in the preparation for that congress, many of them over periods of a year or more. There is no mistaking the urgency of the call which awakened this significant response and brought together in London more than 2,000 people from 54 countries to hear each other's ideas and share their experiences.

These are some of the signs of a changing orientation of science. In the past, science in its purer forms has been content to add to the sum of human knowledge; in its less disinterested preoccupations it has added to the wealth of those who already were in a financial position to subsidize scientific research—theoretically, all to the ultimate advantage of the human race. Only recently have scientists themselves begun to recognize that any increase of knowledge does not at all necessarily work to the advantage of the human race and to be willing, though reluctantly, to accept some responsibility for what is done with the knowledge they uncover. However, other agencies, civil or military, are not generally by any means ready to admit scientists to these sacred areas where business and politics worship the old gods of profit, prestige, and power. Generally, they are not yet ready to see that the exclusion of scientific attitudes from the field of human relations, while employing the full strength of scientific method in the material fields, may well destroy the human race in the not distant future. In spite of this natural reluctance to admit continuing failure and to call for help, and the inevitable defensive disparaging of the scientific attitude at policy levels, it becomes increasingly clear that the designing,

At meetings of the American Psychological Association, held in Boston in September 1948, the Society for the Psychological Study of Social Issues conferred on Dr. Chisholm its first annual Kurt Lewin Memorial Award. The recipient at that time delivered this Kurt Lewin Memorial Lecture. In introducing the speaker and conferring the award, Donald W. MacKinnon, of the Department of Psychology, University of California, stated that the SPSSI had established the award "to commemorate one who in his researches and in his professional activities exemplified the highest goals of the Society, and to encourage, through a recognition of their outstanding contributions, those who, like Kurt Lewin, in their work develop and integrate psychological research and social action." At the time of his death in February 1947, Dr. Lewin was director of the Research Center for Group Dynamics at the Massachusetts Institute of Technology.

building, and operating of modern civilization requires techniques different from those of a generation ago. The builder of a prairie schooner is not qualified by his experience to design or build a turbo-jet aeroplane, nor could any of his contemporaries fly it. Many of our sociopolitical methods are reminiscent of the prairie schooner and pony express days, though the scientists have ushered in an era of instantaneous world communication, and potential world destruction.

To change the metaphor—our civilization, like a great ship, driven by the enormous power of its scientific development, is rushing on into treacherous and unreliably charted seas. The equipment of our pilots is far short of the best available. Their principles, their instruments, and even their charts are commonly inherited from previous generations and founded on folklore, superstition, faiths inculcated in childhood, prejudice, or even, much worse, on local political advantage. It is a fact that in other fields of governmental responsibility the best available experts are invariably employed to design, construct, and operate, whether it be a dam, a ship, an airplane, agricultural production, atomic bombs, a financial or accounting system, or anything else, except in the field of human relations. There, any kind of person may be used. Commonly lawyers are given these responsibilities; their training is in rules and precedent, one of the worst possible technical trainings for this work. Sometimes soldiers are taken from their normal business to be put in charge of our relations with other peoples; their training is in strategical and tactical maneuvering to gain predetermined ends at the expense of an enemy. The whole military training presupposes an opponent and teaches how to circumvent and defeat him, not how to cooperate with other kinds of people who are often as difficult and as sure they are right as we are ourselves. Clearly, military training is also one of the worst possible for this work. Business men trained to make profits or old-time diplomats trained in gentlemanly behavior and the classics are also obviously inadequate to the needs of interhuman relations on a world scale. It is true that a certain number of economists and sociologists in recent years have been given some work to do in the international field, but usually only as technicians or secretariats, to carry out the orders of governing bodies, and rarely on national and intergovernmental policy levels. Also, the training of sociologists and economists tends to concern itself almost exclusively with the study of human institutions and their functioning, not the study of human beings and their interrelationships.

The situation is illustrated by a glance at the position in just one of the agencies of the United Nations. For instance, while the Constitution of the World Health Organization defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" and states that "the healthy development of the child is of basic importance" and "the ability to live harmoniously in a changing total environment is essential to such development," at the First World Health Assembly, attended by representatives of some 68 nations, of which 55 are full members, so far as I have been able to find out there were no psychologists, no social anthropologists, and only one neuropsychiatrist included in national delegations totaling about 250. The one neuropsychiatrist was on the delegation of the Ukrainian Soviet Socialist Republic. No other government felt the need of any technical information or advice in the field of mental health or human relations. This is a highly significant and important fact.

Of course, it is not to be taken for granted that any particular type of technical training now being given at any university would be useful specifically in this enormously important field of interhuman relations. The curricula in political science courses seem to be woefully inadequate to these responsibilities, as do those in psychology, psychiatry, or sociology.

It appears that the idea that the field of interhuman relations should be a major area for man's study and endeavor is not yet sufficiently accepted for any university to have developed a teaching course to train this type of expert. It may well be asked whether such a course could be given and whether there are people capable of teaching it. It is clear that something is known of the subject; social psychologists, social anthropologists, and psychiatrists have been working in that area, at least to some extent, for many years. It does appear, however, that their experiences have not properly been brought together into teachable form. Here is a job of the greatest possible urgency. It is to be hoped that enough demand will arise, from enough places, to insure that the World Federation for Mental Health and the World Health Organization will quickly undertake developmental work of this kind. The Society for the Psychological Study of Social Issues could perform most valuable services in stimulating and helping to guide such developments.

It may well be claimed that all that is needed is the universal application of the ancient injunction to "love thy neighbor as thyself," which derives from the deep gregarious instinct of man and has been promulgated by most of the great religions. In practice such love has commonly been restricted, according to a locally acceptable definition of "neighbor," to the other members of the tribe or the color, racial, re-

ligious, or political group. The requirements for maturity and world citizenship may be called the Christian virtues, the Buddhist virtues, the Hindu virtues, the Mohammedan virtues, or the Confucian virtues, or may be ascribed to many other religions with about equal validity. They could even be called the "psychological virtues."

The catch in this old and widely supported injunction, "love thy neighbor as thyself," is in the last two words. The uncomfortable fact is that very few people indeed can love themselves in a healthy natural way which tolerantly accepts all their own human urges as normal and inevitable aspects of the healthily functioning man or woman. Most of us, by being civilized too early or too forcibly, have been driven to believe that our natural human urges are "bad," "not nice," "wicked," "sinful," or whatever the local equivalent may be. This is the dreadfully damaging concept of "original sin," which really only states that babies are not born civilized according to the local customs of the natives. In this latter form the statement is, of course, true and quite harmless, as long as it is understood by the child that he is not supposed to have been born civilized and, by permission of all legal systems, may take plenty of time about reaching that exalted state. Unfortunately, this is not understood by most children; they have been convicted of sin, believe they are "bad," and consequently deeply despise, distrust, and even hate themselves. The anxiety engendered motivates the projection of these feelings of despising, distrust, and hate on to other people, the neighbors, though usually distinguishable from oneself by some recognizable difference of race, color, creed, economic status, and politics.

The consequent aggressive feelings against such people are experienced as virtuous. It appears that a system which imposes an early belief in one's own sinfulness, or unacceptability in one's natural state, with its consequent inferiority feelings and anxiety, must be harmful to interhuman relationships and to the ability of the human race to survive in the kind of world this has become.

Unfortunately, the concept of "sin" is, under one name or another, very firmly entrenched throughout much of the world. Later in life the feelings which go with this childhood condemnation commonly are attached to thinking or other activities which would be disapproved by prevailing authority. Instead of "bad," one may be reproached with the terms "communist," "reactionary," "Nazi," "nigger-lover," or any of many other epithets. They all signify disapproval and are supposed to produce feelings of guilt and shame. This method of control has been used by all authoritarian systems throughout history to discourage any attempts to change or develop local concepts or customs. This whole method of control should be exposed and combatted by all scientific or mature people.

Let us look briefly at some of the immediate requirements that are not so obvious that no further research is needed to identify them. Much reliable work of recent years has indicated clearly that successful human relations start in infancy. We all know that babies need—not just want, but need—completely uncritical love, love whose manifestations are quite independent of the babies' behavior. In this situation only can the most desirable feelings of being wanted and loved and of "belonging" arise. It is also well known that this "belonging" feeling, in a successful developmental process, should spread gradually to include family, friends, and fellow citizens, and that in the little world this has become, it can no longer safely stop at national boundaries as it reasonably satisfactorily could until just recently.

Now the world must have, and soon, large numbers of people in every country who have grown emotionally beyond national boundaries and are sufficiently mature to be capable of being "world citizens." Up until now very few people indeed in any country have really developed emotionally even to a truly national degree of maturity. Such development to a national level requires an equal degree of concern for the welfare of *all* the kinds of people within the nation, irrespective of color, racial origin, religion, education, social or economic group, or even political party. Few people have reached even this stage of development, and yet only through this stage is it possible to develop to a degree of maturity in which there is a "belonging" feeling in relation to all peoples and an equal concern for the welfare of all of them. Very few such people have been developed, but it is clear that they are the prototype of what the world must have, in large numbers, before there can be any reasonable degree of assurance that the human race will survive for even another generation.

How can the development of this "belonging" feeling be ensured for as many as possible of the children now beginning their lives? It is already clear that they must experience unquestioning and uncritical love, and that they must be free of a "conviction of sin." What else must they have and against what else must they be protected? What are the needs of the growing child of school age, of the adolescent, of the young adult, which need to be met by the community in order that the best possible opportunity to reach real maturity may be ensured?

Next, the responsibility of meeting these needs must be broken down and allocated to the appropriate elements of the community. What do mothers, to be successful mothers, need to know about these matters,

and how should they apply their knowledge? What about fathers? What training should they have for their job? Who should provide the training for mothers and fathers, and when? An answer to this last question is easy: training of mothers and fathers ideally should begin when they themselves are children, but clearly we cannot wait for another two generations. This job must be got at at every possible point of contact. Margaret Mead recently stated that even grandparents can still learn. Many of them certainly can if they receive a little help and are given a chance to recognize their responsibilities.

What do school teachers need of this type of knowledge, and who is responsible for seeing that they get it? What are the responsibilities of town and city councils, of other local authorities, and of state, provincial, or federal governments, and how are local and national institutions to be made aware of these responsibilities and induced to accept them? What kinds of people are needed locally on boards of education or school boards? What should their qualifications be? What do members of city councils need to know about the development of children so they may carry their share of this responsibility? Is it conceivable that it could be generally enough accepted that members of parliaments and congressmen—even senators—need a certain amount of knowledge in this most important field of their responsibilities to the citizens who elect them? What should be the qualifications of legislators to be able so to direct the affairs of a country, particularly in relation to other countries, that the citizens whose lives are in their hands may feel some assurance that they know what they are doing and are working for the good of all the people in the world, the only basis on which it is reasonable to hope that the human race and our own children may survive?

Here are a few of the questions that need to be answered, not by individual research reported in technical language to scientific societies, but by cooperative work eventually reported in nontechnical language to the people of the world through their common channels of communication, the United Nations and its Specialized Agencies. Much of this has already been begun. The statement by the International Preparatory Commission for the International Congress on Mental Health is a notable contribution to these problems. Another significant move has been made by UNESCO's project on Intergroup Tensions, from which has come recently a very valuable report. Of course, these efforts, while tremendously important, are only beginnings. One of their great values is the indication they give that there are at least a few mature people, capable of cooperation in this most difficult of all scientific fields, in many countries.

A few fully mature people, even in the right places, are not enough. Even if all the councils of the United Nations and of its agencies were composed of such people, which they are not, they could still be only partly effective. The United Nations and its agencies are not run by their secretariats. All policies are decided by the governing bodies, executive boards, councils, etc., all composed of national delegations. Even now, many national delegations cannot behave in as civilized, mature, and cooperative ways as they know they should do and as they would like to do because of the certainty that such civilized, mature, and cooperative action would not be acceptable to their own governments or political chiefs. A national delegation cannot misrepresent its own people at home. If the majority of the population of a country is insular, or prejudiced, or antagonistic against some other nation, or aggressive, or just plain ignorant, its delegations in the councils of the nations must reflect those qualities in order to keep their jobs.

The United Nations cannot be blamed for the muddles they have made or their failures in human relations. These muddles and failures are the direct results of the muddled thinking of the people of the nations, of their prejudices, their unreasoned anxieties and hates, and their aggressive pressures. This situation cannot be cured, nor can it be much improved from within the United Nations Organization itself. The degree of our own infantility is illustrated by our desire to leave these responsibilities to our "father equivalent," the government of our particular country or the United Nations. The reform must take place within the nations. Nor can such reforms stem from the national capitals, from the parliaments and congresses. No one can do this extremely necessary job but the people themselves, in the villages, towns, and cities of every country.

There is now only one basic importance in the world, the one importance on which the very existence of the race depends—the emotional relationship between the people of the world. Every political action in every country should be taken in the light of that fact. Whoever helps to elect anyone to any public office in any country, on any other basis than his ability to improve the human relations of the people of the world, gambles with his own life and the lives of his children against, it may be, his hope of a job or of lowered taxes or of the satisfaction he might get from being on the winning side in a battle between political parties. Any or all of these things, weighed against the lives of the hundreds of millions of people the next world war, if it comes, will destroy, make a poor be-

Our own personal responsibility to our fellow humans is clear. Whoever is reasonably informed

(*Continued on page 43, column 2.*)

TECHNICAL PAPERS

Synthesis of Enantiomeric α-Lecithins[1]

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Lecithins containing only saturated fatty acids, known as hydrolecithins, have been shown to occur in nature (*3, 4, 6, 7*). Although numerous attempts have been made to synthesize hydrolecithins, none of these syntheses has yielded the desired product. We have recently accomplished the synthesis of several pure α-hydrolecithins of known spatial arrangement. An α,β-diglyceride in its D-, L-, or racemic form is phosphorylated with monophenylphosphoryl dichloride in the presence of pyridine. The reaction product, without isolation, is immediately esterified with choline chloride. The diacyl-α-glycerylphenylphosphorylcholine chloride is isolated and purified via the reineckate. The reineckate is converted to the sulfate and the protective phenyl group removed by catalytic hydrogenolysis. After elimination of the sulfate ion the resulting hydrolecithin is isolated and is purified by crystallization from a suitable solvent such as diisobutyl ketone.

The following three L-α-hydrolecithins have been synthesized by using as starting materials the corresponding D-α,β-diglycerides, which were prepared according to the procedure described by Sowden and Fischer (*5*):

L-α-distearoyl lecithin (DSL): $C_{44}H_{90}O_9NP$—*Found.* C, 64.6; H, 10.84; N, 1.85; P, 3.81. $[\alpha]_D^{26}+6.1°$ in chloroform-methanol 1:1, c 4.2; $M_D+49.3°$.

L-α-dipalmitoyl lecithin (DPL): $C_{40}H_{82}O_9NP$—*Found.* C, 63.9; H, 11.1; N, 1.87; P, 4.13. $[\alpha]_D^{23}+6.7°$ in chloroform-methanol 1:1, c 4.2; $M_D+50.2°$.

L-α-dimyristoyl lecithin (DML): $C_{36}H_{74}O_9NP$—*Found.* C, 62.0; H, 11.1; N, 1.97; P, 4.43. $[\alpha]_D^{23}+7.0°$; $M_D+48.5°$.

The molecular ratio of choline : phosphoric acid : fatty acids in the synthetic lecithins was found to be very close to 1 : 1 : 2. The three synthetic lecithins, after crystallization from diisobutylketone, gave distinct X-ray diffraction patterns which establish their crystalline structure.

The solubilities of the crystalline lecithins in various solvents were determined. The following values, while not precise, indicate the approximate magnitude of solubility of DSL, DPL, and DML at 22–23° expressed as g/100 ml of solution: dry acetone, 0.01, 0.02, and 0.06, respectively; dry ether, 0.02, 0.02, and 0.03; dry ethanol, 0.8, 1.5, and >15. In addition, all three lecithins are readily soluble both in glacial acetic acid and in chloroform at room temperature, as well as in hot diisobutyl ketone.

The synthetic L-α-dipalmitoyl lecithin was found to be identical with dipalmitoyl lecithin isolated from natural sources (Thannhauser and associates). Thus, the optical purity of the synthetic product and the stereochemical classification of the natural product are established (L-series). The close similarity of the molecular rotation of DPL to those of DSL and DML is a reasonable assurance that both DSL and DML have also been obtained as pure enantiomers and that the synthesis described is one of general application.

Because of the peculiar kind of stereochemistry of asymmetrically substituted glycerol derivatives an unusual situation presents itself: if we consider any particular lecithin as having been derived from the corresponding diglyceride, it would be assigned to one particular stereochemical series, whereas if we consider the same compound as a derivative of the glycerylphosphorylcholine moiety, it would be assigned to the opposite stereochemical series. The reason for this unusual situation is fully discussed elsewhere (*2*). Confronted with the necessity of assigning a stereochemical designation to the synthetic lecithins, an arbitrary choice had to be made between the two possibilities mentioned above. Since the diglyceride portion of the molecule varies from lecithin to lecithin, it seemed logical to choose as a reference compound the glycerylphosphorylcholine moiety, because it is common to all lecithins. The stereochemical relationship of the α-glycerylphosphorylcholines to the glyceraldehydes, the final reference compounds, has already been established (*1*). Thus, by definition, synthetic and natural lecithins containing the L-α-glycerylphosphorylcholine belong to the L-series.

The synthetic procedure described above makes available for the first time individual lecithins of proven configuration and constitution upon which to conduct systematic zymological and other biochemical and physiological studies.

The experimental details will be reported shortly.

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References

1. Baer, E., and Kates, M. *J. Amer. chem. Soc.*, 1948, **70**, 1394.
2. Fischer, H. O. L., and Baer, E. *Chem. Rev.*, 1941, **29**, 287.
3. Lesuk, A., and Anderson, R. J. *J. biol. Chem.*, 1941, **139**, 457.
4. Merz, O. *Z. physiol. Chem.*, 1931, **196**, 10.
5. Sowden, J., and Fischer, H. O. L. *J. Amer. chem. Soc.*, 1941, **63**, 3244.
6. Thannhauser, S. J., Benotti, J., and Boncoddo, N. F. *J. biol. Chem.*, 1946, **166**, 669.
7. Thannhauser, S. J., and Boncoddo, N. F. *J. biol. Chem.*, 1948, **172**, 135.

Notes on the Life History of a Brachylaemid Trematode

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All stages in the life cycle of a brachylaemid trematode have been observed in experimental infections. The cercariae are produced in branched sporocysts in the digestive gland of *Anguispira alternata*; they emerge from the snail and penetrate the same or another individual of *A. alternata* or *Polygyra thyroidus*, migrate to the pericardium, but do not encyst. Developmental and sexually mature stages have been recovered from *Peromyscus leucopus* and from the white mouse. Eggs are produced at about 13 days after ingestion of metacercariae by a white mouse and appear in the feces at about 21 days.

The adult measures 3.5×2.0 mm. The oral sucker is 500×580 μ, and the ventral sucker, 460×560 μ. The pharynx is muscular; the caeca loop back and forth, extend to the posterior end of the body, and have numerous evaginations on both lateral and medial sides. The gonads lie close together, forming a triangle in the most posterior portion of the worm, with one testis on the left side, one in the midline and posterior, and the ovary on the right. The testes are indented. In a mature worm from *P. leucopus* the left testis measures 420×460 μ; the posterior one, 460×540 μ. The ovary is smooth and measures 650×550 μ. The genital pore is median, at the level of the anterior testis. The vitellaria are lateral, follicular and sparse, and extend from the pharynx to the ovary. The uterus fills the body between the caeca from the oral sucker to the anterior testis. Both ascending and descending loops are much convoluted; the descending loop is conspicuous in the dorsal midline. The main collecting ducts of the excretory system are lateral to the caeca, and the bladder empties through a posterior pore.

The thin-shelled but somewhat yellowish egg measures 32×18 μ. The shell is thicker at the adopercular end than elsewhere. Miracidia are visible in the eggs when they are passed by the mice. The larvae do not move, but the adopercular half appears to be ciliated.

The sporocyst is much branched and dendritic and ramifies through the entire liver of the snail. The branching of a fragment is irregular, starting from a roughly defined main trunk. Each branch, but not the main trunk, is divided by constrictions, and may end in a filament with a terminal knob. All parts of the sporocyst except the constrictions are filled with cercariae in different stages of development. Some portions of the sporocyst contain but one cercaria between constrictions; others, from two to many. No birth pore has been observed.

Cercariae washed from the surface of infected snails are about 250 μ long when extended. The tail is a small protuberance in a posteroventral position; the caeca are broad and extend to the level of the center of the ventral sucker; and a prepharynx and short esophagus are visible in a fully extended cercaria. The cuticle bears a f widely-scattered, conspicuous projections, possibly s sory. Just posterior to the ventral sucker is a germi mass. The flame cell pattern has not been enti worked out, but there appear to be 5 flame cells in e anterior quadrant and 4 in each posterior one. The v icular bladder empties through two ducts leading to po on the tail.

The metacercariae are over 1 mm long at maxim size, broad, white and somewhat concave ventrally. T caeca extend to the posterior end and are looped b and forth. There is a thick cuticle which, in the livi worm, is transversely folded and may present a spin or scale-like appearance. Three distinct gonad rudime are present. After three weeks in the second int mediate host the worms still have the cercarial tail, a though they are larger and the caeca have increased i length.

This trematode possibly is identical with the met cercaria described by Leidy in 1847 as *Distoma heli* (renamed *D. pericardium* by Creplin, 1849), and wi *D. vagans* Leidy (1850). The morphological and ta nomic features will be presented in a later publication.

Vitamin B_{14} and Cell Proliferation

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A crystalline compound has been isolated from uri which had a very high activity on cell proliferation *vitro* and on hemopoiesis *in vivo*.

From 100 liters of normal human urine 33 mg of material was obtained as balls of small brown cryst which is designated here as vitamin B_{14}, although i origin and function is probably more that of a hormo than a vitamin. On analysis the material was found t contain 19.6% nitrogen and 4.0% phosphorus. Sulfu was not present. Cobalt was absent, or, if present, the was so small a fraction of a per cent that it could n be considered anything but an impurity.

Rickes, *et al.* (*4*), Shorb (*5*), and West (*7*) have re ported a cobalt-containing compound (vitamin B_{12}) is lated from liver, which had a hematological activity i cases of addisonian pernicious anemia. Smith (*6*) de scribed a pigment from liver as an antipernicious anemi factor which may be identical with vitamin B_{12}.

The activity of vitamin B_{14} was tested on bone marro cultures by the technique previously described (*1*). The results are given in Table 1. The table shows that i bone marrow cultures vitamin B_{14} is at least 5,000,00 times as effective as xanthopterin, or 1×10^{-6} γ/ml o cell suspension gives an increase in the rate of cell pr liferation similar to 5 γ/ml of xanthopterin. Vitamin B_{1} was not toxic in concentrations up to 100 γ/ml. It effect in accelerating cell proliferation is counteracted b 2-amino-4-hydroxy-7-methyl pteridine (7MP), which als counteracts the effect of xanthopterin.

The effect of pterins on cell proliferation in a suspension of cells of neoplastic tissue is opposite to the effect on cells of bone marrow suspension or of normal tissue (*3*). Xanthopterin accelerates proliferation of bone marrow cells and inhibits neoplastic cells. 7MP inhibits bone marrow cell proliferation and accelerates proliferation of cells of neoplastic tissue. Table 2 shows the effect of vitamin B_{14} on a cell suspension of Brown Pearce rabbit tumor.

TABLE 1

EFFECT OF VITAMIN B_{14} ON CELL PROLIFERATION *in vitro* IN A BEEF BONE MARROW SUSPENSION*

Supplement/ml of suspension	Final concentration (RBC/mm³)	Increase in RBC (%)	Final concentration (NC/mm³)	Increase in NC (%)	Retic. /1,000 RBC
None	5,850	19	4,720	64	15
5γ xanthopterin	10,900	120	8,170	184	33
5γ 7MP	2,680	–46	1,680	–42	5
1×10^{-6}γ vit. B_{14}	12,800	161	6,850	138	39
1×10^{-5}γ vit. B_{14}	24,500	400	19,800	665	37
1×10^{-4}γ vit. B_{14}	39,000	695	33,900	1,080	50
1×10^{-2}γ vit. B_{14}	40,200	720	34,200	1,090	46
10γ vit. B_{14}	42,500	766	33,800	1,070	63
100γ vit. B_{14}	41,500	750	32,400	1,020	53
1×10^{-4}γ vit. B_{14} plus 5γ 7MP	28,100	472	23,800	760	40
1×10^{-4}γ vit. B_{14} plus 10γ 7MP	15,600	238	10,800	276	25

* Initial concentration of cells in the suspension: RBC, 4,910/mm³; nucleated cells (NC), 2,880/mm³; reticulocytes, 9/1,000 RBC. Time of incubation, 7.5 hrs at 37° C.

TABLE 2

EFFECT OF VITAMIN B_{14} ON CELL PROLIFERATION *in vitro* IN A SUSPENSION OF BROWN PEARCE TUMOR CELLS*

Supplement/ml of suspension	Final concentration (cells/mm³)	Increase in cells (%)
None	11,200	26
5γ 7MP	15,000	68
10γ 7MP	17,500	96
5γ xanthopterin	6,780	–24
10γ xanthopterin	4,600	–48
1×10^{-7}γ vit. B_{14}	7,960	–11
1×10^{-6}γ vit. B_{14}	4,850	–46
1×10^{-4}γ vit. B_{14}	3,120	–65
1×10^{-1}γ vit. B_{14}	1,320	–85
1×10^{-6}γ vit. B_{14} plus 5γ 7MP	9,100	2
1×10^{-6}γ vit. B_{14} plus 10γ 7MP	11,200	26

* Initial concentration of suspension: 8,920 cells/mm³. Time of incubation, 5 hrs at 37° C.

The technique used in culturing the tumor cells was the same as that previously described (*3*). Vitamin B_{14} is about 10,000,000 times as effective as xanthopterin in inhibiting cell proliferation *in vitro* in a suspension of tumor cells, or 1×10^{-6} γ/ml of vitamin B_{14} had about the same effect as 10 γ/ml of xanthopterin. The effect of 1×10^{-6} γ/ml of vitamin B_{14} was completely counteracted by 10 γ/ml of 7MP, or 1×10^{-6} γ/ml of vitamin B_{14} plus 10 γ/ml of 7MP gave the same rate of proliferation as with no supplement.

In rats made anemic with sulfathiazole by the procedure previously described (*2*), a single injection of 0.01 γ of vitamin B_{14} was as effective in alleviating the anemia and leukopenia as a single injection of 1 mg of xanthopterin.

References

1. NORRIS, E. R., and MAJNARICH, J. J. *Amer. J. Physiol.*, 1948, **152**, 175, 652.
2. NORRIS, E. R., and MAJNARICH, J. J. *Amer. J. Physiol.*, 1948, **152**, 179; **153**, 133.
3. NORRIS, E. R., and MAJNARICH, J. J. *Amer. J. Physiol.*, in press.
4. RICKES, E. L., BRINK, N. G., KONIUSZY, F. R., WOOD, T. R., and FOLKERS, K. *Science*, 1948, **107**, 396; **108**, 134.
5. SHORB, M. S. *Science*, 1948, **107**, 397.
6. SMITH, L. E. *Nature, Lond.*, 1948, **161**, 638.
7. WEST, R. *Science*, 1948, **107**, 398.

Action of Enzymes on Vitamin B_{14} and Pteridines

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The activity of xanthopterin and pteroyl derivatives in accelerating the rate of cell proliferation *in vitro* and in producing hemopoiesis in anemic rats has been found to be greatly increased by the action of certain enzymes.

Xanthine oxidase was prepared from milk and purified by repeated precipitation with ammonium sulfate. The enzyme preparation was very active when measured in a Thunberg tube with methylene blue, using either xanthine or xanthopterin as the substrate. Xanthopterin and folic acid (pteroylglutamic acid) were incubated with the enzyme, under toluene, at 37° C with a phosphate buffer of pH 7.4. Aliquots were removed at intervals for analysis. There was a very marked change in the absorption spectrum, which will be reported later. Kalckar, *et al.* (*1, 2*) have studied some phases of the action of the milk enzyme on xanthopterin.

The effect on cell proliferation of the products resulting from the enzyme action was measured by the technique previously described (*3*). Table 1 gives a summary of typical results obtained.

The activity of both xanthopterin and folic acid was increased by the action of the enzyme. The effect is most noticeable in the case of folic acid. At zero time the number of cells produced in the incubation of the bone marrow culture were the same with folic acid present as with no supplement. After the action of the enzyme the product formed from folic acid very greatly increased the rate of proliferation of both RBC and

nucleated cells (NC). As previously pointed out (*3*), the reticulocyte count is roughly proportional to the rate of erythrocyte formation.

TABLE 1

EFFECT OF THE PRODUCTS FORMED BY THE ACTION OF XANTHINE OXIDASE FROM MILK ON RATE OF CELL PROLIFERATION IN BONE MARROW CULTURE*

Supplement/ml of suspension	Final concentration (RBC/mm³)	Increase in RBC (%)	Final concentration (NC/mm³)	Increase in NC (%)	Retic. /1,000 RBC
None	10,600	24	6,120	44	18
5γ 7MP	4,520	−47	280	−93	4
1×10^{-7}γ vit. B_{14}	17,800	108	13,640	222	36
5γ xanthopterin enzyme—zero time	16,880	98	11,700	175	32
5γ xanthopterin enzyme—5 days	25,200	195	21,900	416	52
5γ folic acid enzyme—zero time	10,640	24	6,560	55	18
5γ folic acid enzyme—5 days	24,300	183	18,900	345	42

* Time of bone marrow incubation, 6 hrs; concentration of initial bone marrow suspension: RBC, 8,550/mm³; NC, 4,240/mm³; reticulocytes, 11/1,000 RBC.

TABLE 2

EFFECT OF THE PRODUCTS FORMED BY THE ACTION OF ENZYMES FROM RAT LIVER HOMOGENATE ON THE RATE OF CELL PROLIFERATION IN BONE MARROW CULTURE*

Supplement/ml of suspension	Final concentration (RBC/mm³)	Increase in RBC (%)	Final concentration (NC/mm³)	Increase in NC (%)	Retic. /1,000 RBC
Liver homogenate (LH)—zero time	9,680	91	5,690	119	24
Liver homogenate (LH)—5 hrs, 37° C	11,400	124	8,400	223	32
5γ xanthopterin plus LH—zero time	18,800	270	15,100	480	34
5γ xanthopterin plus LH—5 hrs	20,400	300	19,600	650	56
5γ folic acid plus LH—zero time	9,100	79	7,100	173	20
5γ folic acid plus LH—5 hrs	16,400	224	13,400	455	42
5γ teropterin plus LH—zero time	9,360	84	6,880	165	24
5γ teropterin plus LH—5 hrs	16,200	219	12,000	360	36

* Time of bone marrow culture incubation, 8 hrs; concentration of initial bone marrow suspension: RBC, 5,080/mm³; NC, 2,600/mm³; reticulocytes, 8/1,000 RBC.

Liver homogenate contains an oxidizing system which will use xanthine or xanthopterin as the substrate in a Thunberg tube with methylene blue. Xanthopterin, folic acid, and teropterin were incubated with a homogenate prepared from rat livers in a Waring blendor. The effect upon cell proliferation in bone marrow culture *in vitro* is shown in Table 2.

Folic acid and teropterin did not produce a greater rate of proliferation than the liver homogenate without supplement before incubation. After incubation with the homogenate the products formed did increase the rate of cell production. The inhibiting action of 2-amino-4-hydroxy-7-methyl pteridine (7MP) was not appreciably changed by incubation with the liver homogenate. The data for 7MP are not included in the table.

TABLE 3

EFFECT OF THE PRODUCTS PRODUCED BY THE ACTION OF ENZYMES FROM RAT GASTRIC MUCOSA ON THE RATE OF CELL PROLIFERATION IN BONE MARROW CULTURE*

Supplement/ml of suspension	Final concentration (RBC/mm³)	Increase in RBC (%)	Final concentration (NC/mm³)	Increase in NC (%)	Retic. /1,000 RBC
Enzyme only (EN)—zero time	8,480	22	6,480	51	16
Enzyme only (EN)—72 hrs	8,300	20	6,250	46	16
2γ xanthopterin plus EN—zero time	13,240	91	9,250	116	30
2γ xanthopterin plus EN—72 hrs	36,500	430	14,600	242	48
5γ folic acid plus EN—zero time	8,320	20	6,050	42	16
5γ folic acid plus EN—72 hrs	37,500	440	16,200	278	52
2γ vitamin B_{14} plus EN—zero time	38,000	450	18,800	340	54
2γ vitamin B_{14} plus EN—72 hrs	39,200	460	17,600	310	48

*Time of bone marrow incubation, 5.5 hrs; concentration of initial bone marrow suspension: RBC, 6,920/mm³; NC, 4,280/mm³; reticulocytes, 11/1,000 RBC.

Gastric mucosa has been associated with hemopoiesis and with the intrinsic factor of Castle. The gastric mucosa of several rats was disintegrated in the Waring blendor with phosphate buffer at pH 7.4, centrifuged, and filtered. The extract contained an oxidase system which would use xanthine or xanthopterin as a substrate in the Thunberg tube with methylene blue. Xanthopterin, folic acid, and vitamin B_{14} were incubated under toluene at 37° C with the gastric mucosa extract. A few results are shown in Table 3.

The activity of the enzyme preparation without supplement did not change during incubation. Folic acid plus the enzyme, when first mixed, gave the same activity or rate of cell proliferation as the enzyme alone. After incubation with the enzyme the products from folic acid and xanthopterin produced a rate of cell proliferation approximately equal to that produced by vitamin B_{14}. The activity of vitamin B_{14} was not altered by incubation with the enzyme preparation.

A single injection of microgram levels of the products produced by both milk and stomach mucosa enzymes on xanthopterin and on folic acid caused a rapid rise in RBC, WBC, and reticulocytes in rats made anemic on a purified diet plus sulfathiazole, equivalent to the effect

of 1 m/kg of xanthopterin by the technique previously described (*4*).

The above experiments explain much of the confusion and conflicting results that have been obtained in the study of the extrinsic and intrinsic factors of Castle. Apparently the extrinsic factor may not be a single substance, but xanthopterin, folic acid, teropterin, and possibly other pteroyl derivatives may serve as the extrinsic factor. Enzyme systems which were present and which were very strong in the gastric mucosa extract and present in the milk xanthine oxidase preparation and the liver homogenate, served as the intrinsic factor. Vitamin B_{14} and the products produced by the action of the oxidase systems on xanthopterin and folic acid appeared to be not identical compounds, although they had similar activity when measured by the techniques used. The end-products of the action of milk, liver, and gastric mucosa enzymes on a single substrate may be different. The active material from xanthopterin is not leucopterin. The chemistry of the various materials is under investigation.

References

1. KALCKAR, H. M., KJELDGAARD, N. O., and KLENOW, H. *J. biol. Chem.*, 1948, **174**, 771.
2. KALCKAR, H. M., and KLENOW, H. *J. biol. Chem.*, 1948, **172**, 349, 351.
3. NORRIS, E. R., and MAJNARICH, J. J. *Amer. J. Physiol.*, 1948, **152**, 175, 652.
4. NORRIS, E. R., and MAJNARICH, J. J. *Amer. J. Physiol.*, 1948, **152**, 179; **153**, 133.

A Synthesis of Benzene, Toluene, and Benzoic Acid Labeled in the Ring With Isotopic Carbon

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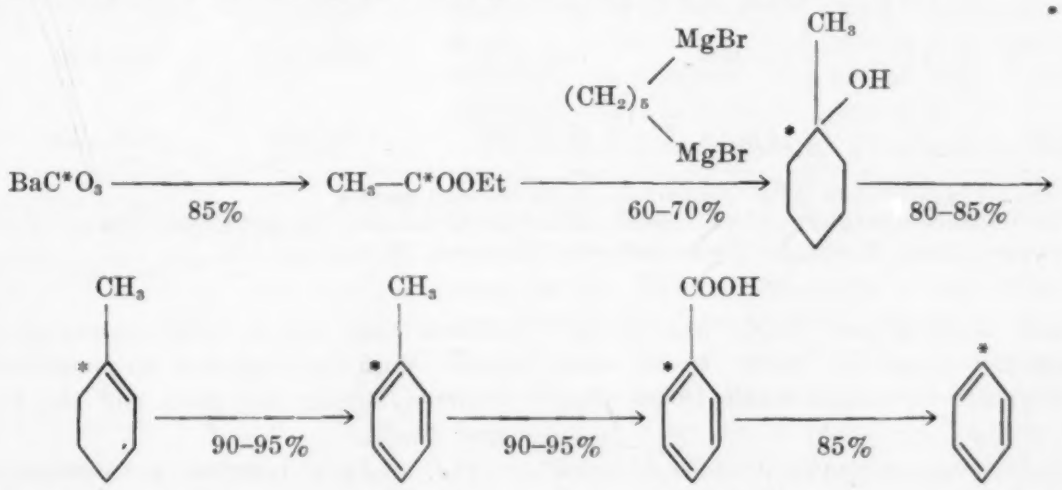
The development of an efficient procedure for the synthesis of benzene, toluene, and benzoic acid labeled in the ring with carbon 13 or carbon 14 is of considerable interest because of the utility of these aromatic compounds in the preparation of numerous substances of importance in organic chemistry, medicine, and biology.



While the synthesis of C^{14}-labeled mesitylene (*2*) affords an intermediate for the preparation of tagged benzene, this procedure suffers from the disadvantages that half of the radioactivity is converted to barium carbonate in an early step of the synthesis and the over-all yield is quite low.

We have found a satisfactory route to toluene and benzoic acid labeled on carbon 1 of the ring and to tagged benzene in the sequence of reactions illustrated above.

The synthesis of carboxyl-labeled ethyl acetate was accomplished by carbonation of methyl magnesium iodide with isotopic carbon dioxide, followed by reaction of the sodium acetate with diethyl sulfate in a modification of the procedure of Sakami, Evans, and Gurin (*4*). Preparation of 1-methylcyclohexanol-1 labeled on carbon 1 was achieved by reaction of carboxyl-labeled ethyl acetate with the Grignard reagent from pentamethylene dibromide according to the procedure of Grignard and Vignon (*1*). Dehydration of the carbinol with iodine as described by Mosher (*3*) afforded 1-methylcyclohexene, which was converted to toluene by vapor-phase dehydrogenation over platinized asbestos (*6*). The benzoic acid, prepared by oxidation of toluene with potassium permanganate (*5*), underwent smooth decarboxylation on treatment with copper oxide and quinoline. The over-all yields from barium carbonate varied from 35 to 50% for toluene, from 30 to 40% for benzoic acid, and from 25 to 40% for benzene.

A particularly attractive feature of this synthesis is the production of toluene and benzoic acid singly labeled on a specific position of the ring. Complete details of the work will be published elsewhere.

References

1. GRIGNARD, V., and VIGNON, G. *Compt. rend.*, 1907, **144**, 1360.
2. GROSSE, A. V., and WEINHOUSE, S. *Science*, 1946, **104**, 402.
3. MOSHER, W. A. *J. Amer. chem. Soc.*, 1940, **62**, 552.
4. SAKAMI, W., EVANS, W. E., and GURIN, S. *J. Amer. chem. Soc.*, 1947, **69**, 1110.
5. ULLMAN, F., and UZBACHIAN, J. B. *Ber.*, 1903, **36**, 1797.
6. ZELINSKY, N. *Ber.*, 1911, **44**, 3121.

A Comparative Study of the Hemoglobin and Red Blood Cells of Representative Diving and Dabbling Ducks[1]

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During the course of an investigation of the adaptations of certain aquatic birds for underwater progression, the blood of a considerable number of diving and dabbling ducks was analyzed, and an attempt was made to ascertain whether or not the characteristic swimming and feeding habits of these two groups of birds may be correlated with their hemoglobin concentration and red blood cell counts.

The 27 diving ducks (Redhead and Greater Scaup) used in this study were trapped on Cayuga Lake between February 20 and March 4, 1946, and the 18 dabbling ducks (Black, Mallard, and Black × Mallard hybrids), between March 5 and 21, 1948. In all cases examinations of the blood were made within 48 hrs after trapping.

Each blood sample of approximately 0.2 cc was drawn into an oxalated pipette from the large basilic vein on the ventral surface of the elbow. The sample was then placed in a vial containing a small amount of powdered heparin. The pipettes for the Hb and RBC determinations were filled from this vial at leisure without danger of clotting. Because of the rapidity with which avian blood coagulates, this method of taking a blood sample was found to be more satisfactory than the usual procedure of cutting a wing vein and drawing up into the counting pipettes the free-flowing blood.

Hemoglobin concentrations were measured as acid hematin with a Fisher Electro-Hemometer.[2] The red blood cell counts were made in duplicate with a Spencer Bright-Line Haemacytometer, and an error of 5% was allowed between counts. Color indices served as a check on the probable accuracy of these determinations and were calculated according to the formula:

$$\frac{\text{gm Hb/100 cc individual sample}}{\text{gm Hb/100 cc mean value for species}}$$

divided by

$$\frac{\text{individual RBC count}}{\text{mean RBC count for species}}$$ (*2*).

Statistical significances were derived by the methods of Snedecor (*3*).

Repeated Hb and RBC determinations, at intervals of 1–3 weeks, were made on the blood of 5 Mallard ducks over a 60-day period. These data, together with the total body-weight changes, are plotted in Fig. 1. During this period the birds were well fed and housed in an outdoor cage, and a careful record of their weight was kept. With one exception, no appreciable loss of weight occurred during this time, and the birds remained in good health.

TABLE 1

HEMOGLOBIN CONCENTRATIONS AND RED BLOOD CELL COUNTS IN DIVING AND DABBLING DUCKS

Species	No. examined	Mean Hb* (gm/100 cc)	Range	Mean RBC† (millions/mm³)	Range	Color index range
Redhead	10♂, 1♀	18.2±0.5	16.2–20.5	3.36±0.07	3.00–3.69	0.87–1.14
Greater Scaup	9♂, 7♀	17.8±0.6	13.0–20.2	3.08±0.10	2.42–3.74	0.78–1.14
Combined diving ducks	19♂, 8♀	18.0±0.4	13.0–20.5	3.21±0.07	2.42–3.74	0.80–1.18
Mallard	8♂, 5♀	18.0±0.6	13.1–23.5	3.49±0.12	2.90–4.60	0.90–1.12
Black	1♂ (?)	17.9	....	3.56	....	....
Hybrid (Black × Mallard)	3♂, 1♀	18.1±0.6	16.4–19.5	3.57±0.14	3.21–3.90	0.99–1.01
Combined dabbling ducks	12♂, 6♀	18.0±0.5	13.1–23.5	3.58±0.10	2.90–4.60	0.90–1.11

* Values of P are all greater than .5 for comparison of Hb between species.

† Values of P for comparison of RBC counts between species are as follows: Mallard-Greater Scaup—P less than .01; Mallard-Redhead—P between .1 and .2; Greater Scaup-Redhead—P between .05 and .02.

The analyses revealed no significant differences in hemoglobin concentration, either between species within a group or between the two groups (diving and dabbling ducks) investigated. Differences in red blood cell counts of the species studied were as follows: (a) Greater Scaup had fewer RBC than Mallard (difference significant); (b) Greater Scaup had fewer RBC than Redhead (difference probably significant); (c) Redhead had fewer RBC than Mallard (difference not significant).

Color indices for the species studied, with one or two possible exceptions, all fell within the range considered normal for human blood (*1*).

[1] The writers wish to acknowledge the assistance of Dr. Juanita S. Newcomer in connection with some of the hemoglobin and red blood cell determinations. Expenses incurred during the course of this investigation were met in part by a grant from the Mrs. Dean Sage Research Fund.

[2] In a few birds Hb concentrations were also measured by the oxyhemoglobin method, using a Sheard-Sanford photoelectrometer, and the values agreed closely with those measured as acid hematin.

Repeated Hb and RBC determinations on the blood of 5 Mallard ducks, which at first sampling exhibited a considerable range, revealed that those ducks having Hb and RBC values at the extreme ends of the range tended to approach, over a 60-day period, the mean for the group (see Fig. 1).

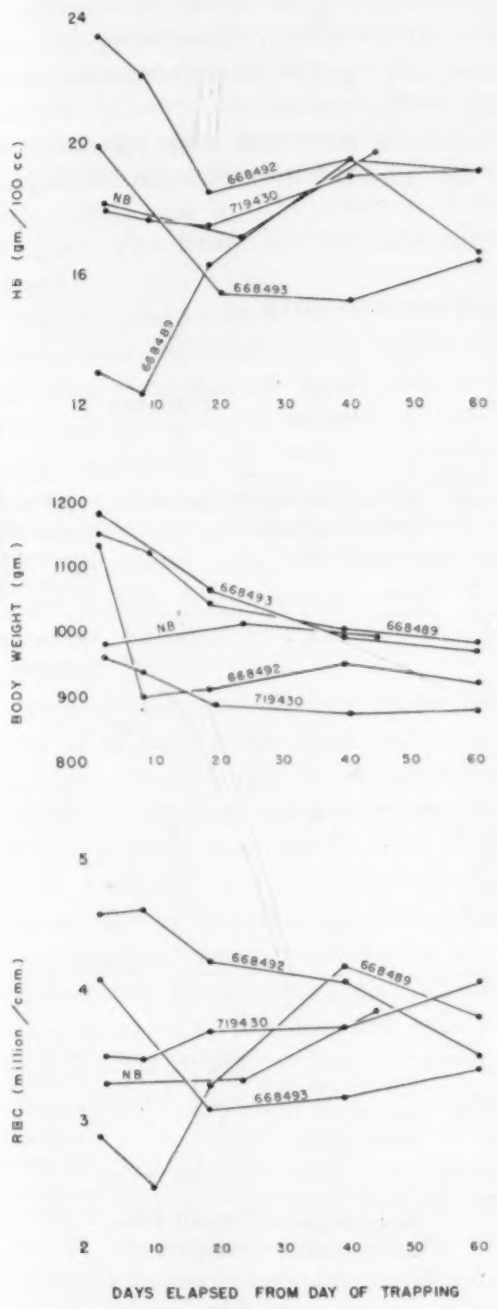

FIG. 1. Changes in Hb, body weight, and RBC count in 5 Mallard ducks over a 60-day period.

It would therefore appear that, while no significant differences exist in the Hb of the ducks studied, considerable variation, even within a group, obtains in the RBC count. Thus, the Greater Scaup has about the same Hb concentration as the Mallard, yet possesses significantly fewer red blood cells. On the other hand, the Redhead not only possesses a Hb concentration similar to that of the Mallard, but its RBC count corresponds closely also to that of the dabbling ducks.

The writers started with the initial premise that an increased oxygen-carrying capacity of the blood would be of adaptive value to the diving ducks, which characteristically swim long distances under water, and that this increased oxygen capacity might be reflected in a higher Hb concentration and RBC count. Our findings reveal, however, that neither the Hb concentration nor the RBC count can be correlated with the locomotor habits of these two groups of birds.

References

1. BECK, R. C. *Laboratory manual of hematologic technic.* Philadelphia: W. B. Saunders, 1938.
2. MAGNER, W. *A textbook of hematology.* Philadelphia: Blakiston, 1938.
3. SNEDECOR, G. W. *Statistical methods.* (4th ed.) Ames: Iowa State College Press, 1946.

Liver Damage by Desoxycorticosterone[1]

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In work on experimental production of gall-bladder disease we found that all dogs treated with desoxycorticosterone acetate[3] showed pathological changes in the liver.

Seven normal mongrel dogs (4 males and 3 females) of an average weight of 10–12 kg each received a daily intramuscular injection of desoxycorticosterone acetate, 5 mg in oil, for 5 days. After a 5-day interval, 25 mg of the drug in oil was given intramuscularly to each dog. Seven to 10 days later the animals were sacrificed and autopsied immediately. Six of the dogs had 1% salt water to drink, and one had tap water.

There were 9 control dogs. Five were untreated, and the other four (2 males and 2 females) were given the peanut oil solvent of the desoxycorticosterone intramuscularly, in the same schedule and quantity as the 7 dogs receiving the desoxycorticosterone in oil. These 4 dogs also received 1% saline to drink. Seven to 10 days after the last injection of peanut oil these dogs were sacrificed and autopsied immediately. The 9 control dogs (untreated or injected with peanut oil) appeared healthy and normal. At autopsy, all organs were normal grossly, and the animals appeared to be in good nutritional condition. The histologic examination of the organs of all animals reported in this paper was performed by our pathologist, Dr. O. Saphir. The organs of the untreated control dogs, including the liver, were found to be histologically normal. In the control animals injected with peanut oil and with only salt water to drink the organs

[1] Aided by a grant from the John D. and Fannie K. Herz Fund.

[2] The Department is in part supported by the Michael Reese Research Foundation.

The advice of Dr. R. Levine, of the Department of Metabolism and Endocrinology, is acknowledged gratefully.

[3] Desoxycorticosterone acetate and its oil solvent were furnished through the courtesy of Ciba Pharmaceutical Products, Inc.

were normal with the exception of a slight cloudy swelling of the liver in 2 of the 4 dogs.

The dogs treated with desoxycorticosterone showed no recognizable effects of the injections, except that they appeared to be more excitable than the control dogs. At autopsy the animals were found to be in a good state of nutrition. Grossly, the only consistent finding was engorgement of the livers of the treated dogs. Microscopic findings in the livers of the dogs treated with desoxycorticosterone were as follows:

No. 1: Marked hyperemia; absence of liver cord cells in the central zone; numerous areas of focal necrosis throughout; accumulation of pigment in the Kupffer cells.

No. 6: Very severe acute necrosis of the liver v absence of normal architecture. In one section the a hyaline, and an organizing thrombus in the portal v

No. 7: Fatty degeneration; some cloudy swel around the central veins; no evident necrosis.

Other organs were affected less consistently and noted in Table 1. Briefly, the following changes w found: cloudy swelling of heart, gall bladder (*4*), k neys, and adrenal cortex, hyperplasia and edema lymph nodes, and hyperemia, pigmentation, and my hyperplasia of the spleen.

In his extensive work with desoxycorticosterone S (*3*) does not mention liver changes. Ellinger (*1*)

TABLE 1

PATHOLOGICAL FINDINGS IN ORGANS OTHER THAN THE LIVER

Dog No. and sex	Drinking water	Heart	Kidney	Adrenal	Spleen	Gall bladder	Pancreas	Lymph node
1, M	1% saline	Cloudy swelling	0	Hyperemia	Marked pigmentation with hemosiderin	Serosal edema extending into muscularis	Hyperemia	Chronic lymp hyperplasia w pigment as in liver and spl
2, M	"	0	Cloudy swelling	Distinct cloudy swelling of zona glomerulosa and fasciculata	0	0	0	Same and hil edema
3, M	"	0	Cloudy swelling	0	Hyperemia and pigmentation, myeloid metaplasia, hypersplenism	0	0	0
4, M	"	0	Cloudy swelling	0	0	0	0	0
5, F	Tap water	0	0	0	Marked pigmentation with hemosiderin	Serosal edema extending into muscularis	0	Chronic lymp hyperplasia w pigment as in liver and spl
6, F	Saline	0	0	Hyperplasia of cortex	0	Hyperemia of submucosa	Small area of necrosis	0
7, F	Other organs not autopsied							

No. 2: Marked hyperemia; numerous areas of focal necrosis and severe fatty degeneration of parenchymal cells; recent bile stasis.

No. 3: Marked hyperemia with foci of recent hemorrhage; focal necrosis, essentially central throughout, as in dogs Nos. 1 and 2; severe fatty degeneration of cord cells.

No. 4: Regions of central focal necrosis and severe fatty degeneration of the liver cord cells; generalized hyperemia and foci of recent hemorrhage throughout.

No. 5: Massive hyperemia and marked pigmentation of the liver cells; numerous areas of periportal fibrosis. This animal received no salt in its drinking water.

ported that desoxycorticosterone protected mice ag the liver damage following irradiation with X-rays. were able to find only one report in the literatur which liver damage was associated with treatment desoxycorticosterone. Forster, *et al.* (*2*) described ings in a boy with adrenal insufficiency who for years received large amounts of desoxycorticosterone extra salt in his diet. According to the autopsy re "the radiating pattern of the liver cords was lost pletely. The cytoplasm of the liver cells was diff reticulated and vacuolated." Microscopic examin of the remaining organs showed no histopatholo changes except in the brain. In order to investigat

lethal factors in this case, they performed experiments in 4 rats, 7 rabbits, and 1 dog. These animals were treated with large doses of desoxycorticosterone but with no excess salt, the rats for 87 days, the rabbits for 15–183 days, and the dog for 70 days. The dog received 5 mg of desoxycorticosterone daily by subcutaneous route. The microscopic findings in the dog were as follows: foamy hepatic cells with collections, in the portal area of plasma cells, eosinophiles, polymorphonuclear leucocytes and phagocytes containing brown pigment. Sections of other organs were found to be normal, except for moderate degeneration of the renal tubules. In 3 rabbits the livers disclosed a diffuse sprinkling with eosinophiles, and in the other 2 rather severe fatty changes. The livers of the rats seem to have been normal.

The changes we have observed in dogs resemble more nearly those reported in the human by Forster, *et al.* (*2*) than their findings in the dog and in the rabbits. This may be explained by the fact that their patient received additional salt while their experimental animals did not. In our dog No. 5, which received no additional sodium chloride, pathological findings in the liver were less pronounced. We feel that the periportal fibrosis found in this dog was not caused by the desoxycorticosterone, but that it may have existed before the experiment.

Thus, pathological changes in the liver were found in each of 6 dogs given desoxycorticosterone and sodium chloride. The changes in the livers consisted of focal and diffuse necrosis (essentially central), fatty degeneration, hyperemia, hemorrhage, and accumulation of pigment. One dog that had received desoxycorticosterone and no salt in his drinking water showed fewer pathologic changes, namely, massive hyperemia and marked pigmentation of the liver cells. Control dogs, receiving only peanut oil by injection and sodium chloride to drink, showed some cloudy swelling or no changes in the liver, and untreated dogs showed no pathologic changes in the liver.

It is generally conceded that noninfectious liver necrosis is due to two main factors, nutritional deficiencies or toxic substances. We feel that the effects of desoxycorticosterone on the livers of our dogs were of a toxic nature, and that the toxic effect was enhanced by the additional salt administered. The doses of desoxycorticosterone given to our dogs were relatively large, but the case of Forster, *et al.* demonstrates that overdosage of desoxycorticosterone can happen in the human and can result in severe and fatal consequences.

References

1. Ellinger, F. *Science,* 1946, **104**, 502.
2. Forster, F. M., Cantarow, A., Herbut, P. A., Paschkis, K. E., and Rakoff, A. E. *J. clin. Endocrinol.,* 1946, **6**, 77.
3. Selye, H., and Hall, C. E. *Arch. Path.,* 1943, **36**, 19; Selye, H. *Textbook of endocrinology.* Montreal, Canada: Univ. Montreal, 1947. P. 850.
4. Sinaiko, E., and Necheles, H. (To be published.)

The Use of an Electrolytic Injector as a "Compensating Device" in Electrophoresis

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Some form of compensation device is usually essential for experiments requiring migration over path distances greater than the actual length of the cell or for attempting electrophoretic separations of proteins. The so-called compensation device is an instrument designed to produce a very small flow of the bulk of the liquid in

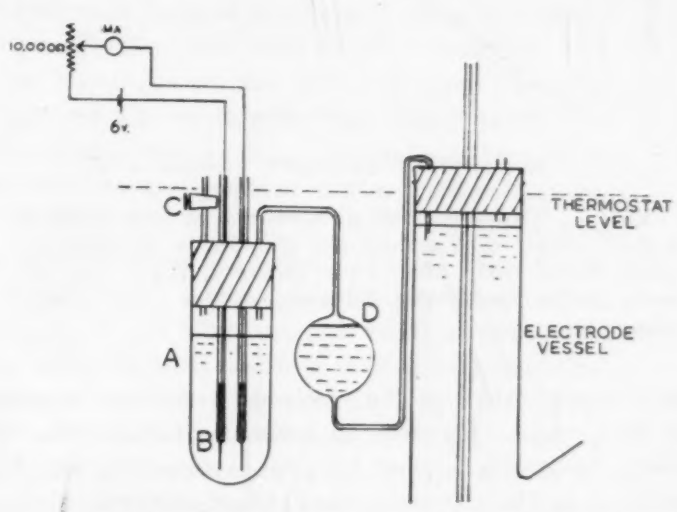

Fig. 1. Diagrammatic form of the electrolytic compensator.

the Tiselius U tube in the opposite direction to the migration of the protein boundary, thus enabling the boundary to be held stationary or even moved in the reverse direction. The design of such a device has followed chiefly two main principles. First, Tiselius (*4*) obtained the displacement of the bulk liquid by slowly dropping a plunger into one of the open electrode vessels of his original apparatus. Longsworth and MacInnes (*2*) later introduced the motor-driven syringe for use with the electrophoresis apparatus which had one closed electrode vessel. A modification of the first principle enabled Svensson (*3*) to use a plunger instrument in the apparatus with both electrode vessels closed. The electrolytic injector to be described here is suited to the original apparatus of Tiselius with both electrode limbs open, or to the modification containing one closed electrode vessel.

The principle of electrolytic injection has been applied in many fields (e.g. *1*) since it was first described, and it remains only to give some indication of one form of the apparatus which may be used for compensation in electrophoresis. The closed vessel, A (Fig. 1), contains approximately $\frac{N}{10}$ H_2SO_4 (or any suitable electrolyte solution) and two platinum electrodes, B (wire of 0.5-mm diameter or foil), sealed in glass tubing to provide external mercury cup contacts. A capillary tap, C,

enables the nozzle and bulb, D, of the injector to be filled with the buffer being used in the particular experiment. The whole may be conveniently fitted to the stand supporting the Tiselius cell and can therefore, apart from the arm entering the actual electrode vessel, be completely thermostatted. In this model, buffer solution

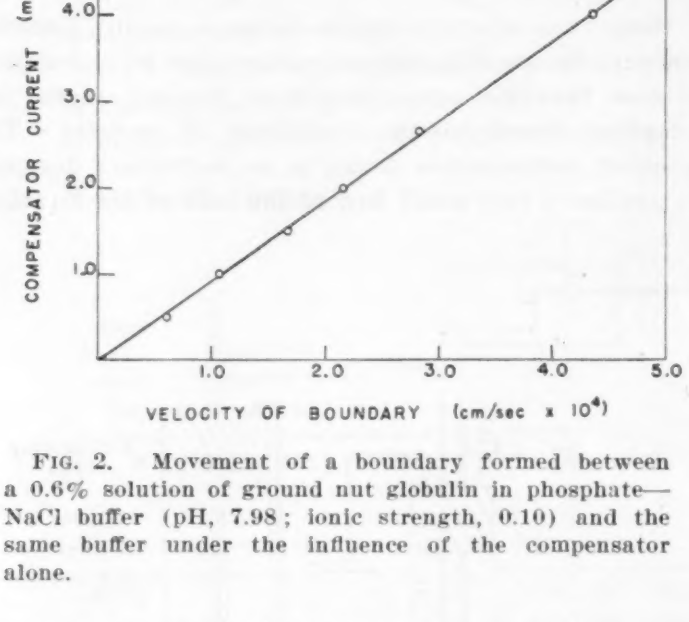

FIG. 2. Movement of a boundary formed between a 0.6% solution of ground nut globulin in phosphate—NaCl buffer (pH, 7.98; ionic strength, 0.10) and the same buffer under the influence of the compensator alone.

identical with that in the electrode vessels is injected into that vessel. However, in a simpler form of the apparatus, in which a glass tube leads directly from the base of A to the electrode vessel, the electrolyte solution

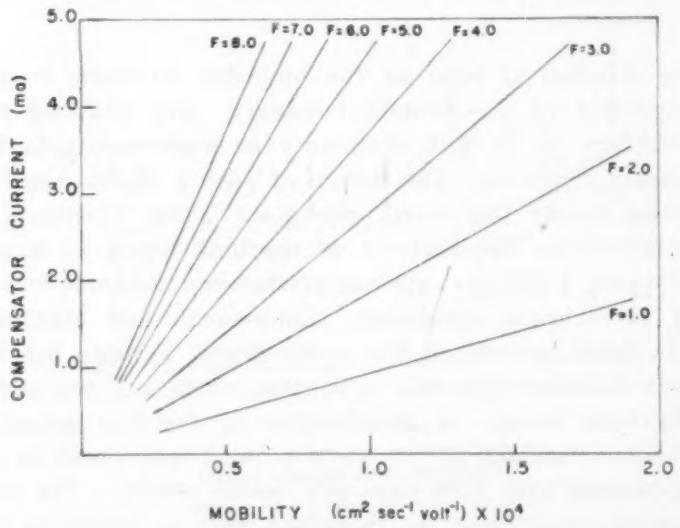

FIG. 3. Calculated mobility/compensator current for exact compensation of boundary used to obtain Fig. 2, at field strengths from 1.0 to 8.0 v/cm. F = field strength.

in A is expelled into the electrode vessel. The former arrangement is, in general, preferable. It is not essential that the injector be fitted before an experiment commences, since it is found that the disturbance to any boundary on gently dipping the nozzle just below the surface of the buffer in the electrode vessel is negligible.

The injector may best be calibrated by observing the motion of a protein boundary under its influence alone, when a graph of the type shown in Fig. 2 is obtained. It is then possible, using the usual relation,

$$\text{Mobility } (\text{cm}^2\ \text{sec}^{-1}\ \text{volt}^{-1}) = \frac{\text{velocity (cm/sec)}}{\text{field strength (v/cm)}},$$

to construct (cf. Fig. 3) a series of linear plots of actual mobility against compensator current for exact boundary compensation at the field strengths more commonly used in electrophoresis. Mobility determinations by this method are only very approximate, and it is more convenient to use the graph of Fig. 3 to estimate the compensator current required to hold a boundary nearly stationary. The duration of the injector depends solely on the volume of the bulb. For example, a short calculation will show that for an additional path length of 8.0 cm the total volume must be in excess of 12 cc. Since the volume may comfortably be 100 cc, the electrolytic compensator will suffice for the longest experiment.

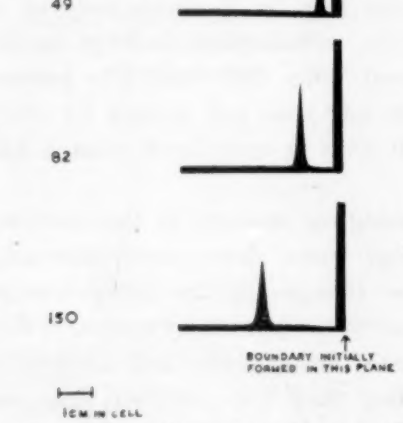

FIG. 4. Boundary formed between 0.6% bovine serum albumin in barbiturate buffer (pH, 8.15; ionic strength, 0.04) and the same buffer, displaced by the compensator. Compensator current, 3 ma.

An important property of the apparatus is the readily continuous control of the compensation afforded by the electrolysis. It has been used successfully to migrate protein components (of concentration down to 0.2%) over equivalent path lengths of 12 cm. At higher compensator currents it has also been used to move the protein boundaries backward to the center flange of the short section cell and hence to isolate the slowest and fastest components in the anode and cathode limbs. When the Tiselius cell is being used (without the electrode vessels) as a diffusion cell, a secondary attachment to the framework allows the nozzle of the compensator to be brought directly into one limb of the top section of the U tube. The boundaries formed in the flanges can then be moved smoothly through several centimeters to their observation positions (see Fig. 4)—a most important factor in diffusion work.

References

1. HERINGTON, E. F. G., and RIDEAL, E. K. *Proc. roy. Soc.*, 1947, **A190**, 289.
2. LONGSWORTH, L. G., and MACINNES, D. A. *Chem. Rev.*, 1939, **24**, 271.
3. SVENSSON, H. *Ark. Kemi, Mineral, Geol.*, 1946, **22A**.
4. TISELIUS, A. *Trans. Faraday Soc.*, 1937, **33**, 524.

Comments and Communications

Natural Vegetation in the Willamette Valley, Oregon

A map of the native vegetation of the United States by H. L. Shantz and Rafael Zon (*Atlas of American agriculture*, Pt. I, Sec. E. Washington, D. C.: Government Printing Office, 1924) shows the Willamette Valley to be covered with Douglas fir timber and makes no distinction between the vegetation of the valley and that of the hills and mountains on either side. In the wall atlas by J. F. Unstead, E. G. R. Taylor, and Geo. Philip, British authors, probably made from records of the Hudson Bay Company, on the map of natural vegetation in the United States, this valley is shown to be a grassland surrounded by fir forests. Which map is right, if either is?

The pioneers found the valley floor largely covered with tall grass, much of which was burned during late summer by Indians during their annual hunts. The following quotations are offered as evidence that neither of the two authorities conveys the correct impression of the country:

"Leaving the Columbia to ascend the Willamette . . ., having passed (the falls at Oregon City) by making a portage, I commenced ascending a clear . . . channel. The banks on either side were bordered with forest trees but behind that narrow belt, diversified with prairie, the landscape was magnificent."—Quoted by R. G. Thwaites (*Early western travels*, Vol. 6, pp. 313–314) from Gabriel Franchere's Narrative, February, 1814.

David Douglas, in his Journal (November, 1826) writes: Along the Langtabuff (now the Long Tom) river—"country open, rich, level, beautiful. . . . We continued (after crossing the Multnomah, now Willamette) our northerly course over an extensive plain intersected by narrow belts of wood and groups of low oaks. . . . At mid-afternoon we came to a small stream flowing in a westerly course to the Multnomah, banks thickly covered with alder, poplar, ash, and willow. (Probably the Calapooia)."

In 1840 the missionary, Rev. G. Hines, wrote in his *Oregon history* (p. 95): "We proceeded southward (from Salem) . . . through a country diversified with rising grounds, . . . fertile valleys variegated with here and there a group of species of red oak and now and then a stately fir which had braved the fury of a thousand storms. At nightfall we camped on the Santa Am's Fork (Santiam) . . . while the fine timber adorning its banks and the extended plains of arable land on each side hold out strong inducements to the immigrant to erect his cabin on its fertile shores."

"Quality (now called Tualatin) Plains are distant twenty-five miles west from Oregon City; they are about twenty-five miles in length, are alternately rolling prairie and timber, surrounded by heavy growth of firs, many of which rise to the height of two hundred and fifty feet," says Gen. Joel Palmer in his Journal of 1845–46 (Thwaites. Vol. 30, pp. 164–190). "The Shahalam (now Chehalem), a small stream, . . . empties into the Willamette (from the west) about twenty miles above Oregon City. It is skirted with good prairies of five or six miles in width near the mountains (Coast): but toward its mouth the valley is covered with timber and fern. . . . On the Yamhill river . . . there are firs more or less along its whole length. From the water courses, upon an average of a little over one-fourth of a mile, the valley is fine prairie land, . . . occasionally interspersed with fine groves . . . and is well covered with grass as every portion of the country that has oaken groves. Between the north and south forks of the Yamhill (west of today's Lafayette) and within six miles of their junction, commences the highlands of the Coast Range; the first plateau is about ten miles wide, and well covered with grass. The second plateau for a few miles is fern openings, with an occasional grove of timber; after this westward to the coast the country is heavily timbered with firs, pine, and occasionally cedar, hemlock, balsam, etc. . . . Upon this (east) bank of the Willamette river ten miles south of Oregon City . . . is a small stream called Pole Alley (now Molalla) which is skirted with beautiful prairie bottoms two to eight miles in length and from one to two miles wide, . . . alternate with groves of fir. Half a mile further south . . . the valley up this (Pudding) river to the Cascades (mountains) is alternately fine prairie and timber lands, with occasional fern openings. It is finely clothed with grass. . . . Eight miles above (the mouth of) Pudding river is a village called Butes (now Butteville). Immediately at this village is a fern opening, covered with an undergrowth of hazel for three-fourths of a mile back, where it merges into an extensive and fertile prairie. . . . From the (Methodist) mission the road proceeds (southward) up the valley, alternately through groves of oak and pine, fern plains, and grassy prairies. . . . The (Willamette) valley at this place (Salem) is about twenty-five miles wide, . . . there are occasional groves of timber interspersing the prairie. The Santiam river banks (20 miles south of Salem) are covered with fir and white cedar of the best quality. This river has four principal branches with several small tributaries, all lined with timber, leaving a strip of beautiful prairie land between each two, from one-half to four miles in width. . . . After leaving the Santiam (southward), a prairie commences, of from four to twelve miles in width, which continues up the valley for a day's travel, I suppose about forty miles. The Willamette valley . . . is beautifully diversified with timber and prairie. The Willamette . . . river itself, throughout its length, has generally a (border) growth of fir and white cedar, averaging from one-fourth to three miles in width."

As demonstrated by numerous descriptions, of which the foregoing excerpts are typical, the pioneers found the Willamette Valley to be a mixed grassland and timberland. There are numerous areas of timber today on land

that has never been under the plow. Most of them were here as larger areas of smaller trees and bushes when the first white people came.

It is well known that soil scientists (Department of Soils, Oregon State College, in consultation) are able to distinguish between forest soils and grassland soils from the characteristics imparted to each by its former vegetative cover. They find here that most of the soils on relatively high elevations on the valley floor are forest soils and that most of those relatively lower and not so well drained have not been covered with timber, thus substantiating the recorded observations of the pioneers. Hence, a map of the natural vegetation of the Willamette Valley should show it as a grassland with a timber cover of less than one-half—probably about one-third or more—of the area of the valley floor.

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A Tree-Trunk Squeeze-Up in Lava

A squeeze-up is a lava mass which was forced upward, while still of semiliquid consistency, through an opening in the hardened surface crust of the flow. Several types of squeeze-ups have been reported by Nichols (*J. Geol.*, 1939, 47, 421–425) for the 220-square mile basalt flow of Recent origin south of Grants, Valencia County, New Mexico, which different authors have termed the Grants or McCarty's Lava Bed or the Aqua Fria Malpais.

An apparently undescribed type of squeeze-up is found in the eastern edge of the northwest lobe of this flow near the Ice Caves Resort, in Section 20 of the township which includes Paxton Springs. A few yards behind the resort headquarters building, near the southeast base of Flagpole Cone, are five or six vertical cylindrical holes in the lava, the largest 18″ in diameter and at least 5′ deep, the exact depth being obscured by accumulated rock fragments. These are popularly known as "devil's smokestacks." The tubes were produced by the flow of magma around standing tree trunks near the edge of the bed where the depth and pressure were relatively limited. No organic material remains, but one of the tubes has markings inside which strongly suggest a mold of the bark of yellow pine (*Pinus ponderosa*). Most of the tree tubes end flush with the rather smooth surface of the pahoehoe lava, but some show a low, weathered rim around the top of the tube, several inches above the general surface. The nature of the rim will be clearer from the following account.

One-tenth mile farther north along the flow's edge is found the best example of a tree tube, combined with an excellent example of a tree-trunk squeeze-up. The cavity is 110″ deep to the present bottom. The inside diameter of the tube averages 17″. A rock chimney readily seen from the Ice Caves branch road, projects 23″ above the horizontal lava surface. The diameter of the tube within the chimney is the same as that below the general surface. The thickness of chimney's wall ranges at different points from 7″ to 10″; the average is about 8″. The inside of the chimney is circular in cross section; the outside, of subcircular form. Close examination of the vertical and base of the chimney reveals parallel striations ning vertically on the unweathered surface, which ex upward for a maximum distance of 10″. Above basal portion, the chimney surface is weathered an regular, and the broken top indicates that this pe hollow cylinder of lava once had a greater height. external basal striations provide proof that the chi originated as a squeeze-up. As the surface crust co and hardened, its shrinkage, in combination with the e ring of the tree trunk's outer tissues, may have been cient to permit the soft viscous magma beneath t squeezed between the remaining wood and the hard cular edge of the cooled crust. Irregularities in latter left their marks formed as vertical striations du upward movement of the semiliquid ring. It is prob that for a chimney wall of such thickness to result, additional factor was necessary—the removal of ments from the edges of the crust by the pressure beneath, widening the gap between the tree trunk the firm crust.

Vertical ridges as much as ⅛ of an inch high o sparsely on the inner surface of the tube proper belo chimney. These are connected by horizontal ridge lower relief, to form square markings. The latter too regular in size and shape to be interpreted a mold of tree bark. If it were not for a smaller secon system of squares within the major system, there w be a superficial resemblance to the distinctive bark alligator juniper (*Juniperus pachyphloea*) which g in the immediate vicinity. The markings strongly gest the "boxwork" found on the walls of certain c but with much lower relief than typical "boxwork." explanation for the pseudo-bark markings can be offe The Recent date of the flow, aridity of the clim fissured and permeable character of the lava, and to raphy make it highly unlikely that this tube ever f with water up to the level of the markings, 80″ from bottom.

ALTON A. LIN

Division of Botany,
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Climatic Changes and Dark Nebulae

In the abstract of Donald H. Menzel's centennial posium paper, "The Sun and the Earth," (*Science*, vember 26, p. 590) there is a discussion of the possib of climatic change being due to the passage of the s system through dark nebulae or clouds of dust. The lowing statement is made: ". . . there is one possibility to consider—a possibility that has not previously suggested, to my knowledge." I wonde Huntington and Visher did not discuss something sim to the above idea of climatic change in their book *matic changes* (Yale University Press, 1922, pp. 247-

WALDO S. G

Macalester College, St. Paul, Minnesota

In Memoriam

Joyce Clennam Stearns

1893–1948

Joyce Clennam Stearns died at his home in Webster Groves, Missouri, on June 11. He had served as director of the Metallurgical Laboratory at the University of Chicago during the last year of the war and since July 1945 had been dean of the Faculties of Washington University in St. Louis.

Stearns was born in Meadville, Missouri, in 1893, studied Liberal Arts at Kingfisher College, took his Master's and Doctor's degrees in physics at the University of Chicago, and taught successively at Albion College and the University of Denver, where he was professor and eventually chairman of the Department of Physics. In the field of teaching, few physicists have earned as high a reputation as did Dr. Stearns. He was among the first to be drawn to Chicago in January 1942, when the atomic program was set up as an active war project.

The climax of his professional career was at Washington University, where, as dean of the Faculties he was the guiding spirit in rebuilding the staff after the disruption of the war.

Stearns' first major scientific work was a demonstration that magnetization of iron makes no considerable change in the positions of the atoms or the electrons of which the iron is composed. This result ruled out the older theory of magnetism, based upon the Bohr atom, according to which the electrons revolving in orbits constituted the elementary magnets that were oriented by the applied magnetic field. It was consistent, however, with the later theories according to which the electrons are themselves magnets that become oriented when the iron is magnetized. Stearns' experiment consisted of magnetizing a crystal of iron from which a beam of X-rays was reflected. He found that no change in the strength of the reflected beam as great as one part per thousand was caused by magnetization, whereas changes of several per cent should have been expected if the orbits in which the electrons revolved had followed the magnetic field.

Stearns also carried on several interesting experiments with cosmic rays, including tests of possible directional effect from the sun and of east-west asymmetry of cosmic-ray showers. His most notable achievement in cosmic-ray studies, however, was his establishment of the high-altitude laboratory on Mt. Evans, just west of Denver. Stearns secured the cooperation of the Denver City Parks in building a road to the top of the mountain and in preparing the site, and persuaded the University of Denver, Massachusetts Institute of Technology, and the University of Chicago to cooperate with Mr. John Evans in building and maintaining the laboratory. He gave valuable aid to the many expeditions to Mt. Evans from several universities by offering his own laboratory at Denver as a low-altitude base of operations and by helping with the experiments in many ways. It would be a fitting tribute, indeed, to name the Mt. Evans laboratory after him.

ARTHUR H. COMPTON
Washington University, St. Louis

(*Continued from page 30.*)

any aspect of human emotional-mental-social development, whoever can do something to clarify thinking even a little and very locally, whoever can help to remove a prejudice, soften a hate, increase the total of understanding and tolerance in the world, by that knowledge, training, insight, or ability is made responsible to do what he can in all possible places. Research is valuable but may remain sterile for long periods, and time is short. Erudite papers read to technical gatherings and published in technical journals have their important place, but may be futile unless appropriate action follows. Responsibility of the informed and technically qualified is to all people, not just to the enlightened.

The really noble example given by Kurt Lewin should continue to be an inspiration. His work and enthusiasm will continue to contribute greatly to present and future developments in the field of human relations. Some part of it can be carried on by every one of us.

Whoever can get at people in homes or schools or universities, in Parent-Teacher Associations, in Home and School Clubs, in youth groups, in churches or service clubs, by talking or writing, through lectures, radio, newspapers, magazines, books, or any other channels of communication, is obligated, by his ability, to serve the human race where he can to the limit of his equipment. Dare any of us say that he or she can do nothing about the desperate need of the world for better human relations?

Book Reviews

Mikro-Methoden: zur Kennzeichnung organischer Stoffe und Stoffgemische. Ludwig Kofler and Adelheid Kofler. Innsbruck, Austria: Universitäts-Verlag-Wagner, 1948. Pp. viii + 337. (Illustrated.) $9.00.

The methods used for characterizing the organic substances described in this book are based on observations of the melting, decomposition, and sublimation points, and refractive indices under the microscope. While this technique is familiar to most chemists, the authors are able to point out many refinements of the established methods. A theoretical discussion of melting-point diagrams is followed by their application to the qualitative and quantitative analysis of mixtures and the molecular weight determination. The authors stress the importance of the determination of the refractive index under the microscope, enabling the experimenter to establish, in a short time and with simple means, a physical constant at temperatures which often forbid the use of ordinary refractometers. With 16 glass powders, with refractive indices ranging from 1.3400 to 1.6718, the index of refraction can be determined with an accuracy of 0.0004.

The tables of a thousand organic substances listing eutectic temperatures (with phenacetin and benzanilide as one of the components), refractive indices, and melting, decomposition, and sublimation temperatures make this book useful on the laboratory shelf. The tables are followed by a valuable, extensive literature list with many references to journals unfamiliar to most American readers. The many diagrams and clear presentation make the book excellent reading material and will undoubtedly give many a stimulating thought to those spending much time in front of the melting-point apparatus.

A. J. Haagen-Smit

California Institute of Technology

Industrial electronics reference book. (Contributions of Electronics Engineers of the Westinghouse Electric Corp.) New York: John Wiley; London: Chapman & Hall, 1948. Pp. x + 680. (Illustrated.) $7.50.

As stated in the Introduction, this book serves as a "digest embracing the applications as well as the design data for industrial electronic equipment." This assignment is admirably fulfilled, since the book contains many excellent graphs, tables, and illustrations on materials and industrial equipment. As a reference book it is necessarily brief in theoretical topics except in the chapters on transmission lines and antennas, whose direct relation to industrial equipment is perhaps not immediately obvious.

The 36 chapters are arranged to form specific groups. The first 4 chapters cover basic information on electrons, their emission, motion in vacuum, and interactions with ions in gas conduction. Chapters 5–10 cover electron tubes of various designs: vacuum, gas, photoelectric, X-ray, cathode-ray, and tubes for ultraviolet produc several of these chapters have very extensive refer lists. Four chapters follow on circuit elements inclu filters, transformers, and tubes, and the next four chap describe circuits as used in conjunction with rectif amplifiers, oscillators, and basic control.

Chapters 21 through 34 deal primarily with indus applications and equipment, e.g. rectifiers and inver R. F. heating (taken from a previously published bo book), industrial X-ray application, precipitation, ap cations of ultraviolet, power line carrier communicat electronic instruments (199 references), and ra Chapters 29 through 32 deal with individual phases control applied to motors, generators, welding, etc.

The final two chapters give information on the care maintenance of electronic equipment.

The book has been well edited, with consistent num ing of subheadings and excellent print. All the auth are well known through other publications. Witho doubt this book fills a gap which existed too long; it prove of great help to practicing engineers and as re ence material for advanced courses in industrial e tronics.

Ernst Wi

Polytechnic Institute of Brooklyn

Drug research and development. Austin Smith and Ar D. Herrick. (Eds.) New York: Revere, 1948. xi + 596. $10.00.

In the first chapter one finds a statement which cou the spirit of this book: "The discoveries and invent in this sphere, merely in the last fifteen years, have c tributed more to the happiness, well-being, and health humanity than has any other advancement." After t lofty beginning the reader is immediately brought dow earth and given a thorough understanding of what is quired to achieve and maintain this advancement. T physician, drug manufacturer, research and laborat worker, pharmacist, detail man, executive, production control worker, attorney, the professor educating p tical men, and the man on the job can all see, in pers tive, their part in this achievement. All can read w much profit and will doubtless find it a valuable refer book.

The authors of the various chapters have all had l experience with the topics they discuss. This would s to guarantee the reliability of the mass of practical formation presented. These authors are from indus universities, and the professions and in many instan have presented information which must have cost th much to acquire. Some of the topics covered are lab tory research, development of biologicals, clinical test development of facilities and controls, labels and label packaging and storing, patent law, trade-marks and la drug regulation, new drug application, biologic con

regulation, drug certification, council acceptance, product development promotion and marketing, advertising, detailing the physician, professional acceptance, and retail price maintenance. A valuable bibliography is also included.

The book is not without surprises. Actually the word "research" is appropriate to the title by courtesy only, for few chapters are allocated to that topic and then, of necessity, from the viewpoint of the drug industry. While it may be admitted that this apportionment of research to the total picture is appropriate, devoted researchers like to think their contribution represents a far greater portion of the total. One chapter unexpectedly contains an excellent discussion of the critical need for animal experimentation, and another contains invaluable advice to medical copywriters. Occasionally one finds certain details emphasized more than once. For example, at four different places the laboratory worker is advised to keep a record to provide legal evidence of work accomplished; tests on stability of drugs are discussed twice. The risks and returns on research investment are discussed four times and not without conflicting viewpoints. Perhaps this serves to emphasize that the editors have extended the utmost latitude and liberty to each author in expressing his thoughts.

WALTER H. SEEGERS

Wayne University

Scientific Book Register

BAVER, L. D. *Soil physics.* (2nd ed.) New York: John Wiley: London: Chapman & Hall, 1948. Pp. xiii + 398. (Illustrated.) $4.75.

BREMEKAMP, C. E. B., and NANNENGA-BREMEKAMP, N. E. *A preliminary survey of the Ruelliinae (Acanthaceae) of the Malay Archipelago and New Guinea.* (Nederl. Akad. Wet., Verh. (Tweede Sectie), Dl. XLV, No. 1.) Amsterdam: N. V. Noord-Hollandsche Uitgevers-Maatschappij, 1948. Pp. 39.

GATES, H. A. *Primary anatomy.* Baltimore: Williams & Wilkins, 1948. Pp. ix + 478. (Illustrated.) $6.00.

CHURCHILL, RUEL V. *Introduction to complex variables and applications.* New York-London: McGraw-Hill, 1948. Pp. vi + 216. (Illustrated.) $3.50.

DAVIS, JOSEPH S. (Ed.) *Carl Alsberg: scientist at large.* Stanford, Calif.: Stanford Univ. Press, 1948. Pp. xi + 182. $2.00.

FINDLAY, ALEXANDER. *A hundred years of chemistry.* (2nd ed.) Cambridge, Engl.: at the Univ. Press; New York: Macmillan, 1948. Pp. 318. $4.50.

FLEURY, PAUL, and COURTOIS, JEAN. *Les diastases.* Paris: Librairie Armand Colin, 1948. Pp. 216. 150 fr.

HENSON, FRANCIS ROGER SPENCER. *Larger imperforate Foraminifera of south-western Asia: families Lituolidae, Orbitolinidae and Meandropsinidae.* London: British Museum (Natural History), 1948. Pp. xi + 127. (Illustrated.) 1£ 10/.

HOSKINS, MARGARET M., and BEVELANDER, GERRIT. *Outline of histology.* Pt. I: *General histology;* Pt. II: *Dental histology and embryology.* (2nd ed.) St. Louis, Mo.: C. V. Mosby, 1948. Pt. I: 180 pp.; Pt. II: 113 pp. (Looseleaf.) (Illustrated.) $3.50.

KABAT, ELVIN A., and MAYER, MANFRED M. *Experimental immunochemistry.* Springfield, Ill.: Charles C. Thomas, 1948. Pp. xv + 567. (Illustrated.) $8.75.

KEENAN, JOSEPH H., and KAYE, JOSEPH. *Gas tables: thermodynamic properties of air products of combustion and component gases and compressible flow functions.* (Rev. ed.) New York: John Wiley; London: Chapman & Hall, 1948. Pp. x + 238. $5.00.

KONORSKI, JERZY. *Conditioned reflexes and neuron organization.* Cambridge, Engl.: at the Univ. Press; New York: Macmillan, 1948. Pp. xiv + 267. (Illustrated.) $4.00.

LIEF, ALFRED. *The commonsense psychiatry of Dr. Adolf Meyer: fifty-two selected papers edited, with biographical narrative.* New York-London: McGraw-Hill, 1948. Pp. xvii + 677. (Illustrated.) $6.50.

LOVERIDGE, ARTHUR. *New Guinean reptiles and amphibians in the Museum of Comparative Zoölogy and United States National Museum.* (Bull. of Museum of Comparative Zoology, Harvard, Vol. 101, No. 2.) Cambridge, Mass.: Museum of Comparative Zoology, 1948. Pp. 307–430.

NEEDHAM, JOSEPH, and NEEDHAM, DOROTHY. (Eds.) *Science outpost: Papers of the Sino-British Co-operation Office, 1942–1946.*) London: Pilot Press, 1948. Pp. 313. (Illustrated.) 25/.

PATTY, FRANK A. (Ed.) *Industrial hygiene and toxicology.* (Vol. I.) New York-London: Interscience, 1948. Pp. xxvii + 531. (Illustrated.) $10.00.

PINCUS, GREGORY, and THIMAN, KENNETH V. (Eds.) *The hormones: physiology, chemistry and applications.* (Vol. I.) New York: Academic Press, 1948. Pp. xi + 886. (Illustrated.) $13.50.

RAISZ, ERWIN. *General cartography.* (2nd ed.) New York-London: McGraw-Hill, 1948. Pp. xv + 354. (Illustrated.) $6.00.

STEVENS, NEIL E. *Factors in botanical publication and other essays.* (Vol. 11, No. 3.) Waltham, Mass.: Chronica Botanica; New York: Stechert-Hafner, 1947. Pp. 119–206. $2.00.

THIRRING, HANS. *Die Idee der Relativitätstheorie: gemeinverständlich dargestellt.* (3rd ed.) Wein, Austria: Springer Verlag, 1948. Pp. 168. $2.80.

WEDEL, WALDO R. *Prehistory and the Missouri Valley development program: summary report on the Missouri River Basin Archeological Survey in 1947.* (Smithsonian Misc. Coll., Vol. III, No. 2.) Wash., D. C.: Smithsonian Institution, 1948. Pp. 52. (Illustrated.)

WOERDEMAN, M. W. *Atlas of human anatomy: descriptive and regional.* Baltimore, Md.: Williams and Wilwins, 1948. (Illustrated.)

———. *Les isotopes: rapports et discussions.* (Septième Conseil de Chimie; Institut International de Chimie Solvay.) (In French and English.) Brussels: R. Stoops, 1948. Pp. 411. (Illustrated.)

NEWS and Notes

Norman H. Topping, associate director of the National Institutes of Health, was recently appointed Assistant Surgeon General of the U. S. Public Health Service. Dr. Topping will continue to serve as associate director of the Institutes.

C. R. Orton, dean of the College of Agriculture, Forestry, and Home Economics and director of the Agricultural Experiment Station of West Virginia University, will resign from his administrative duties next June to engage in research and teaching in the Department of Plant Pathology.

Ford L. Wilkinson, Jr., former dean of the U. S. Naval Postgraduate School, Annapolis, became president of Rose Polytechnic Institute, Terre Haute, Indiana, on January 1, succeeding **Donald B. Prentice** who retired last July.

Emil J. Hellund, associate professor of physics at the University of Oklahoma, has joined the staff of the Theoretical Nuclear Physics Division, Argonne National Laboratory, as a senior physicist.

Mary Baeyertz has been named assistant chairman of the Metals Research Department, Armour Research Foundation of Illinois Institute of Technology. In her new position Dr. Baeyertz will assist Mr. Mahin, chairman of the Department, in general scientific supervision of fundamental and applied research programs for industry and government agencies.

J. Lawrence Pool was recently appointed director of the neurological surgery service at the Neurological Institute of Presbyterian Hospital as well as professor and executive officer of the Department of Neurological Surgery, Columbia University Faculty of Medicine. Dr. Pool has been associated with the Columbia-Presbyterian Medical Center since 1932.

George R. Ringo has been appointed an associate physicist on the staff of the Experimental Nuclear Physics Division of the Argonne National Laboratory. Dr. Ringo had been with the Naval Research Laboratory for the past 7 years.

Edward M. Bernecker, former commissioner of hospitals of New York City, has been appointed administrator of hospital services of the New York University-Bellevue Medical Center, effective January 1. In his new position Dr. Bernecker will be responsible for the administration of University Hospital, the Institute of Rehabilitation, and the various University clinics as well as for the coordination of the clinical teaching programs in other hospitals associated with the Medical Center.

G. Goussef, chef d'Aquarium, Musée de la France d'Outremer, 293 Avenue Daumesnil, Paris 12, will be happy to exchange publications with American workers in the field of hydrobiology and allied sciences.

Paul L. Munson has resigned as head of endocrinology research for Armour and Company, Chicago, to accept an appointment as research assistant professor in the Department of Pharmacology, Yale University School of Medicine.

Gilbert B. L. Smith and **Sol Skolnik** have been appointed head of the Chemistry Division and acting head of the Inorganic Chemistry Section, respectively, in the Research Department, U. S. Naval Ordnance Test Station, Inyokern, China Lake, California. **Harold F. Metcalf** has been made scientific staff assistant to Dr. Smith.

Robert G. Gibbs, former special agent of the Federal Bureau of Investigation, has been made associate editor of *Chemical and Engineering News* and *Industrial and Engineering Chemistry,* publications of the American Chemical Society.

Raymond E. Cray has been appointed professor in the Department of Poultry Science of the Ohio State University College of Agriculture, effective March 28.

George E. Ziegler, acting administrative chief of the Midwest Research Institute, Kansas City, Missouri, since the resignation of Harold Vagtborg 6 months ago, has been made director; **Clayton O. Dohrenwend** has been appointed assistant director of the Institute.

J. A. Salzmann, head of the Department of Orthodontics, Mt. Sinai Hospital, New York City, will leave March 20 for a lecture tour of Mexico, Brazil, and Argentina. The tour is being made at the invitation of Mexican and Brazilian dental societies and by official invitation of the Argentine Government.

Grants and Awards

Brig. Gen. James Stevens Simmons, U. S. Army, Retired, dean of the Harvard School of Public Health, was recently presented the alumni Citation of Merit by John Cunningham, president of Davidson College. At the Convocation Assemblage Gen. Simmons was cited for outstanding contributions in the fields of preventive medicine and public health.

The Research Council on Problems of Alcohol has made grants of $2,500 each to the Biochemical Institute of the University of Texas and to the University of Washington Medical School. The grant to the Biochemical Institute will be used to continue investigations, under the direction of Roger J. Williams, on possible physiological causes underlying problem drinking and that to the University of Washington will support work by Walter L. Voegtlin in the determination of allergic factors underlying chronic alcoholism.

The Woman's Medical College, Philadelphia, has received a grant of $37,302 under the National Mental Health Act for developing psychiatric training for undergraduate medical students. The funds will be made available for the academic year 1949-50 and be paid in annual allotments over a three-year period.

The American Foundation for High Blood Pressure recently awarded grants for research in hypertension and arteriosclerosis to the following: Thomas C. Barnes, Hahnemann Medical College; Stanley E. Bradley, Columbia University; Nor-

man E. Freeman, Franklin Hospital, San Francisco; Meyer Friedman, Mt. Zion Hospital, San Francisco; Sydney M. Friedman, McGill University, Faculty of Medicine; David M. Greenberg, University of California, Berkeley; Keith S. Grimson, Duke University Hospital; Albert I. Lansing, Washington University School of Medicine; Arnold Lazarow and J. W. Patterson, Western Reserve University; Jessie Marmorston, University of Southern California; Campbell Moses, University of Pittsburgh School of Medicine; Frederick J. Moore and Norman C. Flau, University of Southern California; Jean Oliver, Long Island College of Medicine; Ernest W. Page, University of California Medical School; Lelland J. Rather, Stanford University School of Medicine; G. F. Wakerlin, University of Illinois; A. Earl Walker, Johns Hopkins University; Harold Wiggers, Albany Medical College; and Eugene Ferris, University of Cincinnati.

Fellowships

The National Research Council of Canada has announced that about 40 postdoctorate fellowships are available in 1949–50 for research in pure chemistry and physics in NRC laboratories at Ottawa and in the laboratories of the Atomic Energy Project at Chalk River, Ontario. The majority of these will be in chemistry and physics although a few have been assigned to atomic energy research. The fellowships are awarded for one year but may be renewed. They carry a stipend of $2,820, free of income tax, and an additional grant will be made for the expenses of those coming from abroad. There is no nationality restriction for the positions in the Ottawa laboratories; however, those at Chalk River are limited to British subjects. Applications should be made to the National Research Council, Ottawa, Canada, not later than *March 1*, 1949.

The Sigma Delta Epsilon Research Fellowship in Science is again being offered this year. This predoctoral fellowship, which carries a stipend of $1,200, is awarded to women who give evidence of outstanding ability and promise and who need financial assistance to further a well-defined research project in the mathematical, physical, or biological sciences. Application blanks, which must be submitted before *February 1*, may be obtained from Dr. Virginia Bartow, 7 Chemistry Annex, University of Illinois, Urbana, Illinois. Announcement of the award will be made early in March.

The Institute of Gas Technology at Illinois Institute of Technology will accept applications for fellowships until *March 15*, 1949. Fifteen fellowships, each carrying a stipend of $125 per month for ten months, with increases in the following months, are available. Seniors and graduates under 28 years of age, who have backgrounds in chemistry, chemical engineering, mathematics, mechanical engineering, and related fields, are eligible. Applications should be addressed to the Director, Institute of Gas Technology, Technology Center, Chicago 16.

Colleges and Universities

A new measurement of the distance of the earth from the sun, based on more than 5,000 observations of the moon, was reported by Dirk Brouwer, director of the Yale University Observatory, at the meeting of the American Astronomical Society in New Haven the last week in December. The computations show the distance to be 92,960,000 miles, subject to an uncertainty of not more than 35,000 miles. The project was begun by the late Ernest W. Brown, professor of mathematics at Yale, and from 1932 through 1942, 5,100 observations were made from 200 locations over the world, data from which were sent to Yale Observatory. This system of measurement is based on the gravitational pull of one body upon another —in this case of the sun upon the moon.

The University of Minnesota, Duluth Branch, has announced the following staff appointments: Raymond W. Darland, formerly of the University of Nebraska, associate professor of botany; Moses Passer, formerly of Cornell University, assistant professor of chemistry; Herbert C. Nelson, consulting engineer, instructor in civil engineering; Samuel Weiner, former research chemist for the Paul-Lewis Laboratories, assistant professor of chemistry; and Harlan D. Fayle, former instructor at Duluth Junior College, instructor of chemistry.

"The Physical Chemistry of Large Molecules" will be the subject of the new Wayne University "Frontiers of Chemistry" series scheduled for early 1949. Planned especially for those interested in the fields of rubber, plastics, proteins, and other materials of complex molecular structure, the series will feature lectures by prominent scientists on successive Monday evenings. The University Chemistry Department and the International Society of the Friends of the Kresge-Hooker Library are jointly sponsoring the symposium.

Paul J. Flory of the Cornell University Chemistry Department will be the speaker for the initial program on February 28. His subject will be "Thermodynamics of Polymer Solutions." Subsequent lectures will be: March 7 — Robert Simha, National Bureau of Standards, "Viscosity of Solutions of Large Molecules"; March 14—Raymond Fuoss, Sterling Chemical Laboratory, Yale University, "The Physical Chemistry of Polyelectrolytes"; March 21 — Raymond Boyer, Dow Chemical Company, "Structure and Properties of Polymer Gels"; March 28—Hubert M. James, Purdue University, "Theory of the Elasticity of Rubber-like Materials"; April 4—Henry B. Bull, College of Medicine, Northwestern University, "Physical Chemistry of Protein Hydrolysis"; April 11—John T. Edsall, Harvard Medical School, "Size, Shape, and Molecular Configuration of Protein Molecules"; April 25—Max A. Lauffer, Physics Department, University of Pittsburgh, "Physical Chemistry of Viruses."

Graduate credit for the lecture series will be available to qualified registrants. Those interested in attending on a noncredit basis may obtain information from J. Russell Bright, Department of Chemistry, Wayne University, Detroit.

Fire has completely destroyed the building housing the School of Medicine and the Department of Parasitology of the University of Chile. All equipment and a library which con-

tained 10,000 reprints on parasitology, tropical medicine, and rural health have been lost. Readers of *Science* having reprints available on these subjects who would like to assist in the reconstruction of the library may address material to Amador Neghme R., Professor of Parasitology, University of Chile, P. O. Box 9183, Santiago, Chile.

Meetings and Elections

A Symposium on Recent Research in Food and Milk Sanitation, under the sponsorship of the Sanitation Study Section, Division of Research Grants and Fellowships, U. S. Public Health Service, will be held January 26–27 in Washington, D. C., in the Department of Commerce Auditorium. Current research in bacteriology, epidemiology, entomology, veterinary medicine, etc. will be discussed by specialists from various governmental agencies, colleges, and universities. Registration will take place at 9 A. M. Thursday and the first meeting will begin at 10 A. M.

The Metropolitan Microchemical Society of New York is sponsoring a symposium at the American Museum of Natural History, New York City, February 25–26. The program has been planned to stimulate further interest in the field of microchemistry, and the public is invited to attend. The flame photometer, radioactivity in microanalysis, determinations of traces of elements, instrumentation, application of electrochemistry to the analysis of small amounts of material, and the ultracentrifuge will be topics of discussion. Those wishing to attend the Friday evening dinner and the Saturday afternoon luncheon, both at the Hotel Bolivar, should send their reservations to the chairman, Al Steyermark, Hoffmann-La Roche, Inc., Nutley 10, New Jersey, not later than February 17.

The Ecologists Union, devoted to the preservation of natural biotic communities for scientific use, has elected the following officers by mail ballot: president, A. O. Weese, University of Oklahoma; vice-president, F. W. Albertson, Fort Hays Kansas State College; member of the Board of Governors, Richard H. Pough, American Museum of Natural History. Ralph W. Dexter, Kent State University, continues as secretary-treasurer.

The Committee on the Study of Plant and Animal Communities, under the chairmanship of S. Charles Kendeigh, University of Illinois, will publish in the near future an inventory of nature sanctuaries in North America. The Committee for the Preservation of Natural Conditions, with Curtis L. Newcombe, Cranbrook Institute of Science, as chairman, has given support this past year to protection of natural areas in Massachusetts, Pennsylvania, and Iowa as well as Federal projects of conservation, particularly for the creation of a National Grassland Monument and support for the Blatnik-Thye Bill, H.R. 6240 and S. 1090, as a step toward the creation of a Quetico-Superior National Park.

A meeting of the American Society for X-Ray and Electron Diffraction took place at Battelle Memorial Institute, Columbus, Ohio, December 16–18. The scientific sessions included a number of papers featuring microtechniques. The proposed plan for a single society to take the place of the ASXRED and the Crystallographic Society of America was discussed in the business meeting. The group was addressed at dinner by Max von Laue.

The Nebraska Section of the American Chemical Society has elected its officers for 1949. They are: H. T. Bates, president; Bennet D. Hites, vice-president; and Henry F. Holtzclaw, Jr., secretary-treasurer. All are associated with the University of Nebraska.

The Division of Gas and Fuel Chemistry of the American Chemical Society has elected the following new officers: G. Robert Yohe, head of the Coal Division of the Illinois State Geological Survey, chairman, to succeed Calvert C. Wright, chief of the Division of Fuel Technology of the Pennsylvania State College School of Mineral Industries; Ralph E. Brewer, of the U. S. Bureau of Mines, Pittsburgh, chairman-elect; and H. Beecher Charmbury, of Pennsylvania State College, secretary-treasurer (a re-election). Dr. Yohe and Dr. Wright represent the Division on the Society's National Council, and Dr. Brewer and Henry Hakewill, Jr., of the Institute of Gas Technology, Chicago, are the alternate councilors.

The Division of Rubber Chemistry, American Chemical Society, has elected Howard I. Cramer, director of development, Sharples Chemicals, Inc., Philadelphia, chairman, and Frederick W. Stavely, director of research, Firestone Tire & Rubber Company, Akron, chairman-elect. Charles R. Haynes, manager of rubber service, Binney & Smith Company, New York, and C. W. Christensen, sales manager of the Rubber Service Laboratories, Monsanto Chemical Company, Akron, were re-elected secretary and treasurer, respectively. Harry E. Outcault, manager of zinc oxide sales, St. Joseph Lead Company, New York, former chairman, has now become a member of the Division's board of directors.

The International Institute of Embryology has elected the following American scientists to membership: Howard B. Adelmann, Cornell University; L. G. Barth, Columbia University; Donald P. Costello, University of North Carolina; S. R. Detwiler, Columbia University; R. M. Eakin, University of California, Berkeley; Gerhard Fankhauser, Princeton University; V. Hamburger, Washington University; E. B. Harvey, Princeton University; Arthur T. Hertig, Boston University; Chester H. Heuser, Carnegie Institute; Leigh Hoadley, Harvard University; J. S. Nicholas, Yale University; A. Mandel Schechtman, University of California, Los Angeles; L. S. Stone, Yale University; Victor C. Twitty, Stanford University; Albert Tyler, California Institute of Technology; Paul Weiss, University of Chicago; B. H. Willier, Johns Hopkins University; E. Witschi, State University of Iowa; and L. F. Yntema, Cornell University.

The incorporators of the Scientific Research Society of America, a new national scientific research society, announced the election of the following officers and Board of Governors November 27 at their Cleveland convention: chairman, George A. Stetson, editor of publications of the American Society of Mechanical Engineers; director, Donald B. Prentice,

past-president, Rose Polytechnic Institute; treasurer, George A. Baitsell, executive secretary, Society of the Sigma Xi; members of the Board, Joseph W. Barker, president, Research Corporation, New York City; W. V. Houston, president, Rice Institute, Houston, Texas; M. C. K. Jones, Esso Research Laboratories, Elizabeth, New Jersey; William Procter, Palm Beach, Florida; George A. Stetson; C. G. Suits, director, Research Laboratory, General Electric Company, Schenectady, New York; C. A. Thomas, executive vice-president, Monsanto Chemical Company, St. Louis, Missouri; William E. Vaughan, Shell Development Company, Emeryville, California; and Edward R. Weidlein, director, Mellon Institute, Pittsburgh, Pennsylvania; and members of the Board, ex officiis, Carl D. Anderson, president, Sigma Xi; George A. Baitsell; and George B. Pegram, treasurer, Sigma Xi. The national headquarters has been established at 54 Hillhouse Avenue, Yale University, New Haven, Connecticut.

NRC News

The Division of Geology and Geography has available three new publications.

"The Rock-Color Chart" ($5.50), especially designed for field use, but also suitable for office or laboratory, includes 115 colors which indicate the range of rock colors for all purposes and a brief text explaining the systems used for the chart arrangement and color names. The Munsell sytsem has been used for form and arrangement, and color names have been taken from the ISCC-NBS system. The Munsell numerical designation is also given for each color chip. The chart was prepared by the Rock-Color Chart Committee, a Subcommittee of the Committee on Symposium on Sedimentation, including E. N. Goddard, U. S. Geological Survey; Parker D. Trask, Geological Society of America; Ronald K. DeFord, American Association of Petroleum Geologists; Olaf N. Rove, Society of Economic Geologists; and Joseph T. Singewald, Jr., and R. M. Overbeck, both of the Association of American State Geologists.

A "Report of the Committee on the Measurement of Geologic Time, 1946–1947, Inclusive" ($1.00) includes reports and articles by John Putnam Marble, chairman of the Committee, Arthur Holmes, University of Edinburgh, L. H. Ahrens, Alfred C. Lane (chairman of Committee until July 1946), and R. F. Beers.

Another publication, "Report of the Committee on a Treatise on Marine Ecology and Paleoecology, 1946–1947" ($1.00), prepared under Harry S. Ladd, chairman, and Kenneth E. Lohman, vice-chairman, includes reports and sections on current activities, recently published papers, completed units of annotated bibliographies of Marine Ecology and Paleoecology, and several articles.

Copies may be obtained from the Division headquarters at the National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

The Committee on Research in Endocrinology has announced that requests for grants-in-aid during the fiscal year, July 1, 1949–June 30, 1950, will be received until *February 28*. Work in the general fields of experimental and clinical endocrinology as well as studies of the effect of sex hormones on nonsexual functions, such as general metabolism and the metabolism of steroid hormones, will be considered. Investigators seeking support for research in the problems of sex in the narrower sense, however, should direct their proposals to the Committee for Research in Problems of Sex rather than that on Endocrinology. Applicants must submit a statement of the problem and plan and information regarding the method of attack, the institutional support of the investigation, and the uses to which the grant will be put. The funds may not be used by the recipient institution for administrative expenses. Blanks may be obtained from the Secretary, Division of Medical Sciences, National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

Deaths

Robert Stephen Briffault, 72, British surgeon, anthropologist, and author, died December 11 in Hastings, England.

Arial W. George, 66, a pioneer radiologist, died December 24 in Brookline, Massachusetts. Dr. George was one of the first Americans to receive the Sir James Mackenzie-Davidson Memorial Medal of the British Royal Society of Medicine in recognition of his application of Roentgen rays to disease diagnosis.

Frank Irwin, 80, professor emeritus of mathematics at the University of California, died December 25 in Berkeley, California.

Samuel J. Plimpton, 65, professor of physics at Worcester Polytechnic Institute, died December 29 at Worcester, Massachusetts.

Edward S. Johnson, 86, chemical research consultant for the drug, dye and explosives industries, died December 30 in New Rochelle, New York.

A. Herman Pfund, 69, professor emeritus of physics at Johns Hopkins University and former president of the American Optical Society, died January 4 in Baltimore, Maryland.

Two seed packages can now be ordered through CARE for delivery in Austria, Belgium, Czechoslovakia, Finland, Italy, France, Greece, the Netherlands, Poland, Great Britain (England, Scotland, Wales, Northern Ireland) and the American, British, and French Zones of Germany and Berlin. For family use, a package contains enough seeds to plant a garden $50' \times 150'$ and to yield fresh vegetables throughout the summer months as well as those suitable for canning and storage for use next winter. The other package contains 20 lbs of hybrid field corn seed, enough for planting 2½ acres. The latter may be harvested for feed for fattening meat animals or for maintaining a high level of production in dairy cattle. Complete instructions in the appropriate language are included in each package. The packages may be ordered, at $4 each, from CARE, 50 Broad Street, New York City 4, or from CARE outlets in several of the major cities.

The U. S. Civil Service Commission has announced an examination for Physical Science Administrators, $5,232 to $10,305 per annum, for posi-

tions in Washington, D. C., and vicinity. Applicants must have completed a 4-year college course majoring in physical science, mathematics, or engineering; an equivalent in technical experience; or an appropriate combination of the two. At least three years of professional experience which has included or been supplemented by administrative experience in fields of physical science is also required. No written test will be given. Information and application blanks may be obtained from the U. S. Civil Service Commission, Washington 25, D. C.

Libraries in devastated countries may now subscribe to *Psychometrika*, the quarterly journal of the Psychometric Society at a special reduced rate of $3.00. The usual subscription rate it $10.00. According to Albert K. Kurtz, secretary of the Psychometric Corporation, the Board of Directors has authorized this policy for 1949 on an experimental basis. Libraries wishing to take advantage of this offer should send checks, payable to the Psychometric Corporation, to Edward E. Cureton, Treasurer, 853, East Brewster Road, Alcoa, Tennessee.

The National Registry of Rare Chemicals, 35 West 33rd Street, Chicago 16, Illinois, has announced the following list of wanted chemicals: pentazine; myristicinaldehyde; D- and L-xyloketose; 6-menthen-2-ol; carbonyl sulfide; 3-tropanone; 2-amino-5-hydroxy-n-valeric acid; urobilinogen; melissyl alcohol; 5-hydroxy-1,4-naphthaquinone; thymidine; adonidin; isovanillin; coumingine; gelseminine; harmine hydrochloride; zinc carbonyl; titanium difluoride; cevadine; and germanium dichloride.

The Third Michigan International Exhibition of Nature Photography, under the sponsorship of the Cranbrook Institute of Science and several Michigan nature societies, has been scheduled for the period March 26–April 3 at the Detroit Flower Show, and for the period April 5–15 at the Cranbrook Institute. All student, amateur, and professional photographers here and abroad (the entry fee may be waived for exhibits from foreign countries from which it is impossible to send money) are invited to submit nature pictures in competition for either the print or transparency groups. The exhibits will usually fall into one of the following categories: I. Zoological—all animals (except pets), birds, fish, reptiles, insects, etc; animal products such as corals, shells, fossils, bones, nests, etc; II. Botanical—plants, trees, flowers, mosses, shrubs, fungi, etc; III. Scenery—where emphasis is on geological aspects and natural phenomena; and IV. Micro and macro photographs of any natural science subject. In addition to the first, second, and prize ribbons, special awards will be given for exhibits on fresh-water algae; ferns; mnerals; insects; astronomy; birds; mammals; and flowers. Particulars may be obtained by writing to Roger E. Richard, Chairman, P. O. Box 2411, Dearborn, Michigan. The deadline for receipt of entries of *March 14*, 1949.

The National Council of the American Institute of Chemists has passed the following Resolution:

WHEREAS, Congressional Investigating Committees can produce results of great value to the country and,

WHEREAS, The value of their work depends on an impartial uncovering of facts and,

WHEREAS, Their ability to obtain valuable and useful information is lessened by premature public statements unsubstantiated by proof and,

WHEREAS, Such premature public statements may cause injustice to be done to American citizens, and may endanger national security,

Therefore, be it *Resolved*, That the American Institute of Chemists, acting through its National Council, urges that Congressional Investigating Committees proceed with judicial restraint and with due regard for the rights of all witnesses.

The American School of Prehistoric Research, located at the Peabody Museum of Harvard University, Cambridge 38, Massachusetts, recently announced the appearance of Bulletin 16, "The Neolithic Period in Bulgaria," by the late James Harvey Gaul. This illustrated publication (253 pp.) is a study of the earliest food-producing cultures of eastern Europe and of the connections of that area with Neolithic Greece. Although the monograph cost $7.00 to produce, the School is offering it to interested individuals and institutions at $4.75. Several other important manuscr are awaiting publication.

Make Plans for—

American Institute of Electr Engineers, winter general meet January 31–February 4, Hotel Stat New York City.

National Conference on R **Health,** February 4–5, Palmer Ho Chicago, Illinois.

International Geographical Un 16th Congress, April 8–15, Lisb Portugal.

5th International Congress Comparative Pathology, May 17- Istanbul, Turkey.

Recently Received—

Light on a medical mystery. Edu tional pamphlet of the Natio Multiple Sclerosis Society, New Y Academy of Medicine Buildi Fifth Avenue and 103rd Street, N York City 29.

College Board Review. Publish quarterly by the College Entra Examination Board, 425 West 11 Street, New York City 27.

Mental Hygiene News. Publish monthly except July and August the New York State Department Mental Hygiene through the St Hospitals Press, 1213 Court Stre Utica, New York.

The Institute News. Printed and p lished by the Franklin Institu Benjamin Franklin Parkway 20th, Philadelphia, Pennsylvania.

The promotion and acceleration of m tallic corrosion by microorganis by T. Howard Rogers. Reprint fr the *Journal of the Institute Metals*, 1948, Vol. 75, Pt. 1. P leased by the Institute of Metals Grosvenor Gardens, London, S. W.

Studies in Japanese Pselaphidae (Co optera), I. Introductory materi checklist, and key to genera, by C lando Park. (Bulletin of the C cago Academy of Sciences, Nove ber 30, 1948.)

The neutral element base of mat and probable cause of gravitati by Santiago Antunez de Mayo Lima, Peru: Universidad Nacio Mayor de San Marcos, 1948.